DOCUMENT RESUME

ED 124 100 HE 008 003

AUTHOR	Green, Jack N., Ed.
TITLE	National Conference on Campus Safety (19th, Brown University, Providence, Rhode Island, June 26-23, 1972). Safety Monographs for Schools and Colleges, No. 32.
INSTITUTION	Brown Univ., Providence, R.I.; National Safety Council, Chicago, Ill. Campus Safety Association.
PUB DATE	72
NOTE	109p.
EDRS PRICE	MF-$0.83 HC-$6.01 Plus Postage.
DESCRIPTORS	*Campuses; Campus Planning; Conference Reports; *Educational Facilities; Fire Protection; Handicapped; *Higher Education; Laboratory Safety; Program Design; Radiation; *Safety; School Architecture; *School Safety; Science Laboratories; Small Schools

ABSTRACT

Most of this conference report is made up of papers presented on miscellaneous campus safety topics: two papers titled "Handicapped on Campus," by Charles Wingstrom and by Joseph F. Kuchta, Sal Mazzata, and Charles A. Cofield; "Radiation Hazards and Control" by Howard Browne; "Safety in the 70's" by Harold E. O'Shell; "OSHA (Occupational Safety and Health Administration) on Campus" by Jerry Dempsey; "Inside Fire" by Rexford Wilson; "Safety and the University Supervisor" by Leonard Marcus; "Faculty Liability" by Edward J. Regan; "Development and Operation of a Safety Program on the Small College Campus" by Leonard Vanderveld, Jr.; "Safety Review of Architectural Plans" by J. P. Eaker; and "Laboratory Safety" by Warren H. Munroe. Minutes of the annual meeting of the Campus Safety Association, the conference program, and lists of conference participants are also included. (JT)

****
* Documents acquired by ERIC include many informal unpublished *
* materials not available from other sources. ERIC makes every effort *
* to obtain the best copy available. Nevertheless, items of marginal *
* reproducibility are often encountered and this affects the quality *
* of the microfiche and hardcopy reproductions ERIC makes available *
* via the ERIC Document Reproduction Service (EDRS). EDRS is not *
* responsible for the quality of the original document. Reproductions *
* supplied by EDRS are the best that can be made from the original. *
****

ED124100

SAFETY MONOGRAPHS FOR SCHOOLS AND COLLEGES

MONOGRAPH NO. 32

NINETEENTH NATIONAL CONFERENCE on CAMPUS SAFETY

HE 008 003

U S DEPARTMENT OF HEALTH,
EDUCATION & WELFARE
NATIONAL INSTITUTE OF
EDUCATION

THIS DOCUMENT HAS BEEN REPRODUCED EXACTLY AS RECEIVED FROM THE PERSON OR ORGANIZATION ORIGINATING IT. POINTS OF VIEW OR OPINIONS STATED DO NOT NECESSARILY REPRESENT OFFICIAL NATIONAL INSTITUTE OF EDUCATION POSITION OR POLICY

1972

A joint project of
Brown University,
Providence, Rhode Island, and the
Campus Safety Association
of the National Safety Council
425 North Michigan, Chicago, Illinois 60611

Nineteenth National Conference on Campus Safety

Brown University

Providence, Rhode Island
June 26-28, 1972

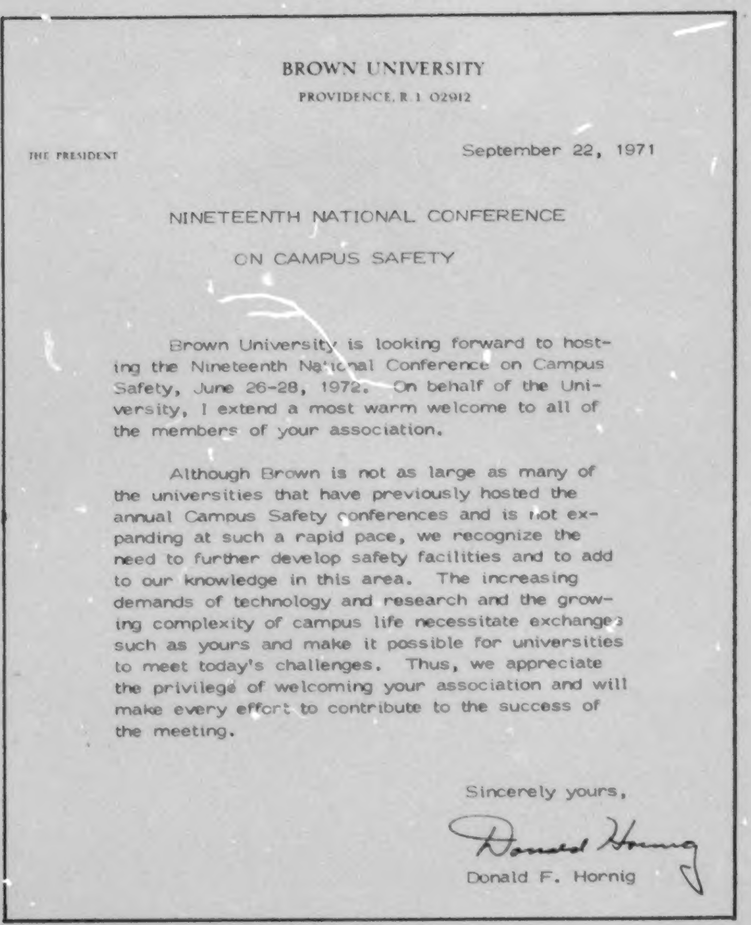
Editor . . .
Jack N. Green
Assistant Manager
School and College Department
National Safety Council

Brown University

CARRIE TOWER

UNIVERSITY HALL AND VAN WICKLE GATES

Donald F. Hornig
President



BROWN UNIVERSITY
PROVIDENCE, R.I. 02912

THE PRESIDENT

September 22, 1971

NINETEENTH NATIONAL CONFERENCE

ON CAMPUS SAFETY

Brown University is looking forward to hosting the Nineteenth National Conference on Campus Safety, June 26-28, 1972. On behalf of the University, I extend a most warm welcome to all of the members of your association.

Although Brown is not as large as many of the universities that have previously hosted the annual Campus Safety conferences and is not expanding at such a rapid pace, we recognize the need to further develop safety facilities and to add to our knowledge in this area. The increasing demands of technology and research and the growing complexity of campus life necessitate exchanges such as yours and make it possible for universities to meet today's challenges. Thus, we appreciate the privilege of welcoming your association and will make every effort to contribute to the success of the meeting.

Sincerely yours,

Donald Hornig
Donald F. Hornig

Campus Safety Association

THE CAMPUS SAFETY ASSOCIATION

Originally formed in 1949, the Association was affiliated with the National Safety Council in 1956 and became a division of the College and University Section formed in 1957. The Association makes a sincere effort to be of service to the members and others interested in Campus Safety.

OBJECTIVE

The objective of the Association is to promote safety on college and university campuses by exchange of information on prevention of accidents to faculty, staff and students.

MEMBERSHIP

Membership is open to any person whose activities are related to college and university safety programs. Besides campus safety administrators, present membership also includes radiation safety officers, security personnel, physical plant superintendents, insurance personnel, residence hall directors and many more. Membership in the Association automatically provides membership in the College and University Section.

MEMBERSHIP APPLICATIONS

Application blanks may be obtained from the Staff Representative; there are no dues. Members are entitled to voting privileges and are eligible to serve as officers or as members of committees.

OFFICERS

The Association officers are chairman, vice chairman, corresponding secretary, recording secretary and treasurer. The vice chairman automatically succeeds to the chairmanship.

STANDING COMMITTEES

The permanent committees of the Association are Nominating, Membership, National Conference on Campus Safety Planning and Congress Program Planning.

NATIONAL CONFERENCE ON CAMPUS SAFETY

The primary activity of the Campus Safety Association is an annual National Conference on Campus Safety held in the early summer on the campus of a member college or university. An effort is made to present successive conferences at as wide spaced geographical locations as possible.

The annual conference, of several days duration, is a combination of education, training and discussion of specific problems. The proceedings of the National Conference on Campus Safety are published in a Monograph. Copies are available from the National Safety Council for a small charge.

NATIONAL SAFETY CONGRESS

A mid-year business meeting is held in October of each year in conjunction with the National Safety Congress in Chicago. Informal get-togethers, workshops and sessions of interest to campus safety members are scheduled during the Congress. Oftentimes arrangements are made to hold joint meetings with other divisions and sections of the Council.

NATIONAL COLLEGE & UNIVERSITY SAFETY AWARDS

This program is designed to provide initiative for programming and achievement in campus safety programs along standard lines, and also to recognize novel or original safety efforts by colleges and universities.

Each entry is evaluated by the members of the Judges Committee and rated as follows: President's Letter, Certificate of Commendation, Award of Merit, Award of Honor (top award). Entry blanks and information about the program may be obtained from the College and University Section, National Safety Council.

ACCIDENT REPORTING

The Association believes that an important ingredient of a campus safety program is an accident reporting system. Assistance and materials for initiating an accident reporting program can be obtained from the College and University Section, National Safety Council.

OFFICERS AND COMMITTEE MEMBERS

Campus Safety Association Officers 1972-1973

Chairman — Ray Ketchmark, University of Illinois at Chicago Circle

Vice Chairman — Eric W. Spencer, Brown University

Corresponding Secretary — William A. Watson, Florida State University

Recording Secretary — Oliver K. Halderson, Southern Illinois University

Treasurer — Raymond C. Hall, University of Colorado

Eric Spencer
Host Chairman

Left to Right: Eric Spencer, Ray Ketchmark, Ray Hall, Earl Rupp, William Watson and Reginald Brett.

Victor Osborne
Program Chairman

Executive Committee

Past Chairman — Earl V. Rupp, University of Wisconsin

William H. Steinmetz, University of California at Santa Barbara

Edward W. Simpson, University of Nebraska

Reginald L. Brett, University of Toronto

PROGRAM COMMITTEE — NATIONAL CONFERENCE ON CAMPUS SAFETY

Victor Osborne, Yale University, Chairman

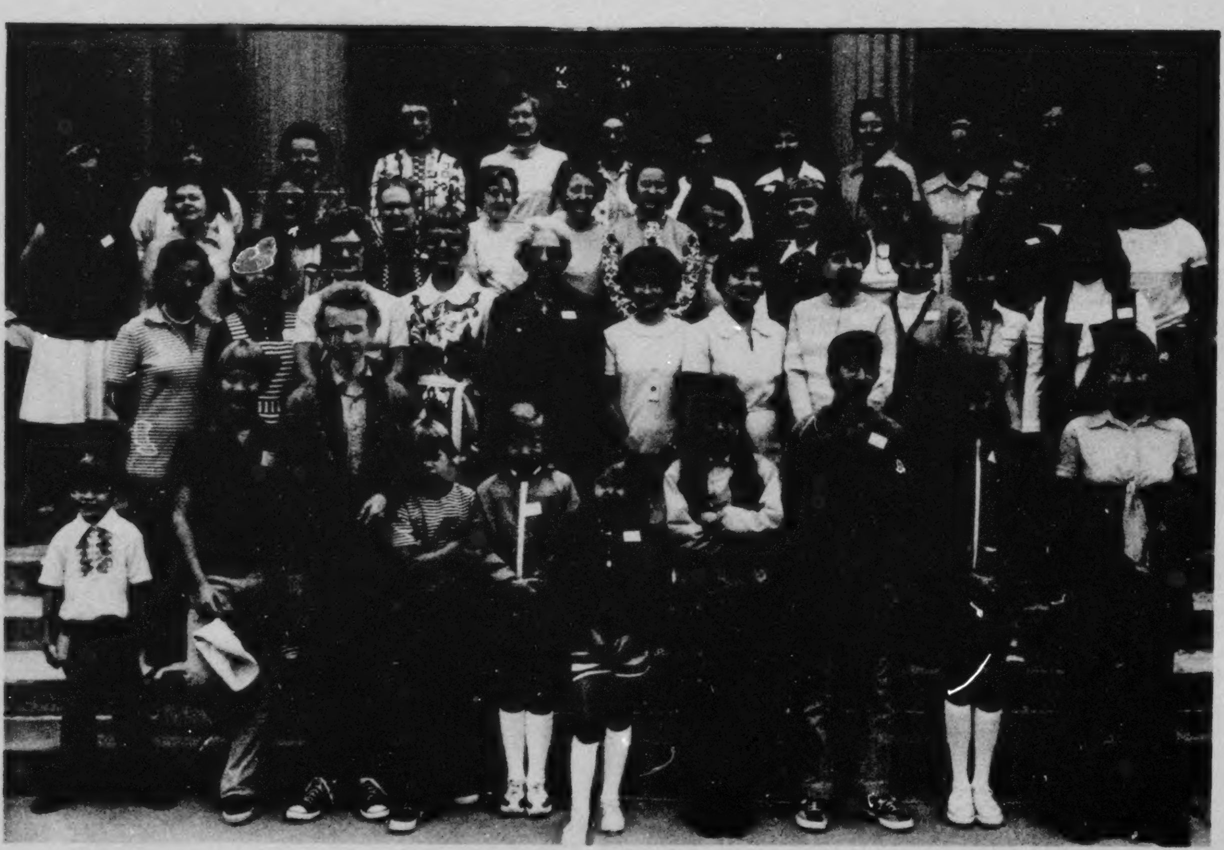
Chandler Eaton, Harvard University

Robert Gleason, University of Massachusetts

Joseph Kuchta, Massachusetts Institute of Technology

Eric Spencer, Brown University, Host Chairman

PARTICIPANTS' FAMILIES



Front Row: (All names are listed left to right.) Sidney Browne, Arthur Browne, Jack Browne, Henry Browne, Claire Knocke, Janet Knocke, Gina Spencer, Dave Knocke, Linda Knocke, Jo-Anne Spencer.

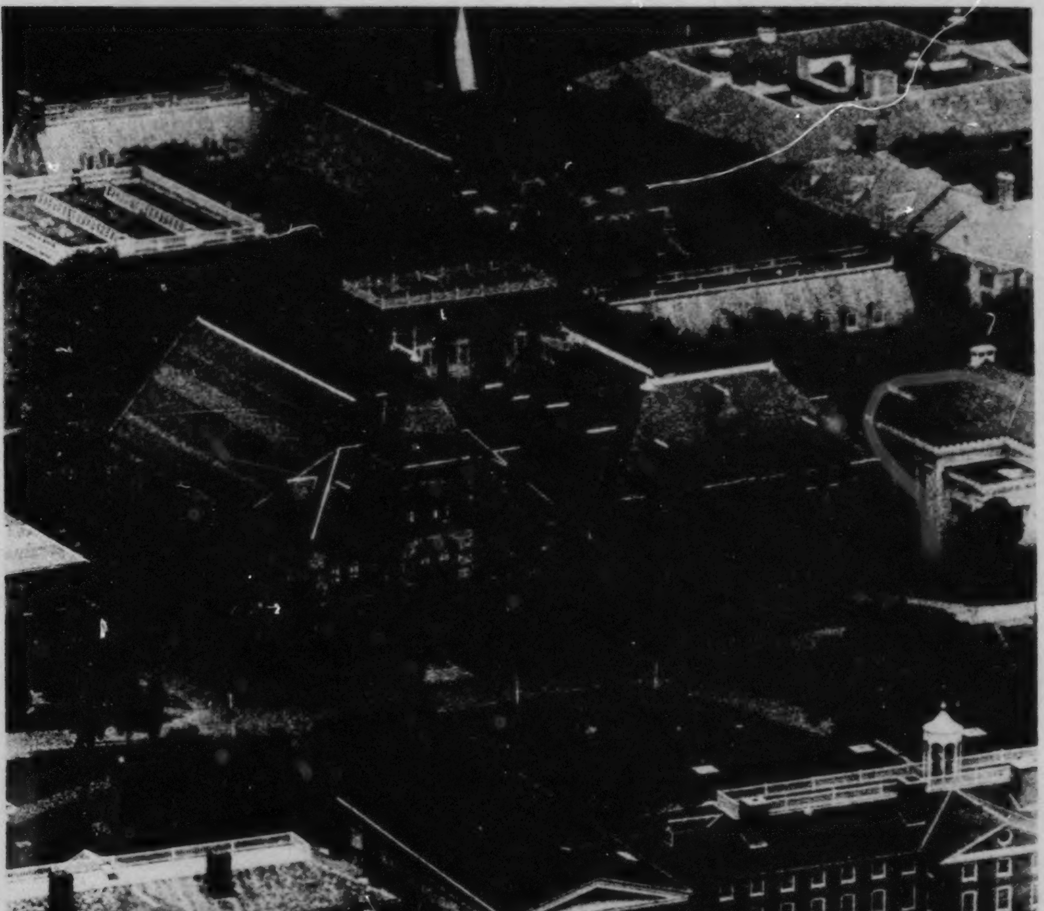
Second Row: Mrs. Ray Hall, Mrs. George Hayworth, Mrs. Hubert Hayes, Mrs. Robert Wirbel, Mrs. W. H. Watson, Mrs. Fred Wenzel, Dorothy Goodberg, Bernadine Knacke, Pat Wingstrom, Virginia Robbins, Eleanor Spencer.

Third Row: June Browne, Fern Orsborn, Donna Hanson, Dorothy Jones, Charlotte Ketchmark, Ruth Provow, Amy Ozaruk, Lucille Anderson, Harriet Lapish, Lenora Clifford, Elaine Vanderveld, Pam Hall.

Fourth Row: Carole Orsborn, Lorraine Hanson, Bernice Thomas, Hilda Brett, Zenia Munroe, Addie Elliot, Delilah Logan, Muriel Vilbert, Betty Sullivan, Elizabeth Temme.

BROWN UNIVERSITY

Campus



COLLEGES REPRESENTED BY STATES AT THE NINETEENTH NATIONAL CONFERENCE ON CAMPUS SAFETY

ALASKA

University of Alaska, College

ARIZONA

University of Arizona, Tucson

CALIFORNIA

California Institute of Technology, Pasadena
California State University, Los Angeles
University of California, Berkeley

COLORADO

Colorado State University, Fort Collins
University of Colorado, Boulder

CONNECTICUT

Connecticut College, New London
University of Hartford, West Hartford
University of New Haven, New Haven
Yale University, New Haven

DISTRICT OF COLUMBIA

Howard University, Washington

FLORIDA

Florida State University, Tallahassee
Pensavola Junior College, Pensacola

GEORGIA

Medical College of Georgia, Augusta

HAWAII

University of Hawaii, Honolulu

ILLINOIS

Illinois State University, Normal
Northwestern University, Evanston
Sangamon State University, Springfield
Southern Illinois University, Carbondale
University of Illinois, Champaign
University of Illinois, Chicago Circle
University of Illinois, Medical Center, Chicago

INDIANA

Indiana University, Bloomington
Purdue University, West Lafayette
University of Notre Dame, Notre Dame

IOWA

Iowa State University, Ames
University of Iowa, Iowa City

KANSAS

Kansas State University, Manhattan

KENTUCKY

University of Kentucky, Lexington

MAINE

University of Maine, Orono

MARYLAND

Baltimore Community College, Baltimore
University of Maryland, College Park

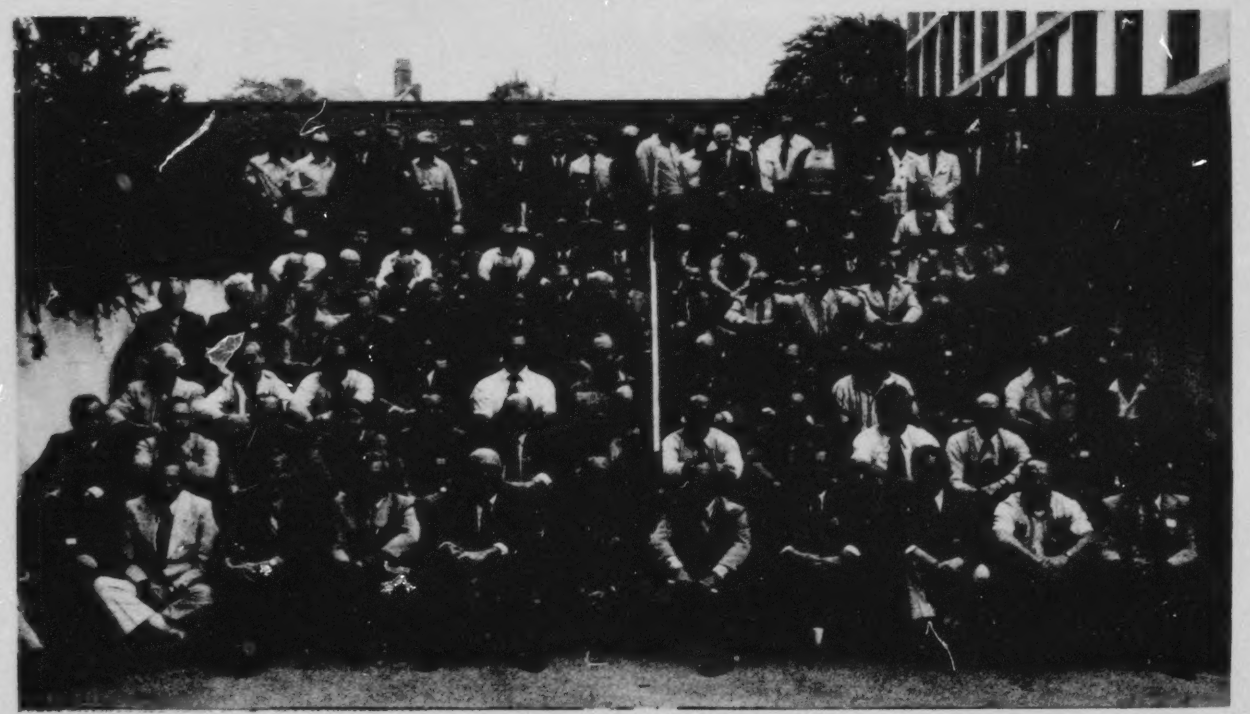
MASSACHUSETTS

Babson College, Babson Park
College of the Holy Cross, Worcester
Deerfield Academy, Deerfield
Endicott Junior College, Beverly
Harvard University, Cambridge
Massachusetts Institute of Technology, Cambridge
Northeastern University, Boston
Northfield-Mt. Hermon, Northfield
Tufts University, Medford
University of Massachusetts, Amherst
Wellesley College, Wellesley
Wentworth Institute, Boston

MICHIGAN

Eastern Michigan University, Ypsilanti
Michigan State University, East Lansing
Oakland State, Rochester
University of Michigan, Ann Arbor
West Michigan University, Kalamazoo

Conference Participants



Front Row: (All names are listed left to right.) Al Livingstone, Arthur Nutt, Sam McCord, P. Latorre, R.P. Gleason, Al Orsborn , Pat Eaker, John C. Marsden, Howard Browne, John Lambert, Jim Fritz.

Second Row: Leroy N. Howard, Ken C. Fay, Jack C. Faust, Dick Teel, Jack Sutton, Reginald Brett, Jack F. Jones, Azmi Philip Imad, Ray Diffley, James A. Duda, Earle W. Brown, Douglas Provow, Claude F. Cantrell.

Third Row: Roland Flocksom, John Temme, James Coakley, Gary W. Luker, Jim Dawson, Warren H. Munroe, John Petersen, Leonard Vanderveld, Ray Hall, Neil Poppensiek, Stanley Fox, Ken Conn.

Fourth Row: Jack Breetveld, Earl Rupp, Roscoe Clifford, Lew Legg, Nick Ozaruk, Frank Kilpatrick, Phil Lapish, Joseph Faraldo, Donald Eckelberger, John Hill, W.D. Hoeye, Larry Blake, Victor Osborne.

Fifth Row: George Hayworth, Dave Keller, Walter F. Bosky, Art Hibbard, Ben Duykman, Ed Riley, Ed Dunne, Ben F. Vilbert, Bob Jones, Nelson Fontneau, no name, Leon Scholnick, Fred Vogt.

Sixth Row: Jim Knocke, Jim Hickerson, Hubert Hayes, Bill Watson, Ray Stephens, Ron McGill, Charles Wingstrom, Richard Giles, Thomas Jones, John Morris, Steve E. Logan, S. M. Morrison, Don Robbins.

Seventh Row: (seated) Charles Cofield, Sal Mazzata, (standing) Rod Bollick, Fred Wenzel, Frederick Thomas, no name, (seated) Thomas Hanson, Willard Whitaker, no name, Rod E. Vollink, Frederick A. Wenzel.

Eighth Row: (all standing) Joe Compagno, Joe Smolen, Arthur Papastathis, Ray Ketchmark, George Crooks, Carl Eigenauer, Joseph Kuchta, Anton J. Leppier, no name, Michael C. Syracuse, Saxon Elliott, Henry M. Anderson, Eric Spencer, John Stott, Jack Goodberg, Arthur J. Beaumont, Bob Wirbel, J.E. Hudson, Jack Green Sr., Gerald Gooze.

MISSISSIPPI

Mississippi State University, State College

MISSOURI

Florissant Valley Community College, Ferguson
University of Missouri, Columbia
University of Missouri, Rolla
University of Missouri, St. Louis

NEBRASKA

University of Nebraska, Lincoln

NEW HAMPSHIRE

Dartmouth College, Hanover

NEW JERSEY

College County of Morris, Dover
Princeton University, Princeton

NEW YORK

Cornell University, Ithaca
New York City Community College, Brooklyn
Queensboro Communicy College, Bayside
State University of New York, Binghampton
State University of New York, Buffalo
The Rockefeller University, New York

NORTH CAROLINA

Duke University, Durham
University of North Carolina, Chapel Hill
University of North Carolina, Charlotte
Wayne Community College, Goldsboro

OHIO

The Ohio State University, Columbus

OKLAHOMA

Oklahoma State University, Stillwater

OREGON

Oregon State University, Corvallis

PENNSYLVANIA

Baptist Bible College of Pennsylvania, Clarks Summit
Elizabethtown College, Elizabethtown
Muhlenberg College, Allentown
University of Pennsylvania, Philadelphia

RHODE ISLAND

Barrington College, Barrington
Brown University, Providence
Providence College, Providence
Rhode Island School of Design, Providence

TEXAS

East Texas State University, Commerce
Texas A & M University, College Station
University of Texas, Austin

VERMONT

University of Vermont, Burlington

WEST VIRGINIA

West Virginia University, Parkersburg

WISCONSIN

University of Wisconsin, Madison
University of Wisconsin, Milwaukee

CANADA

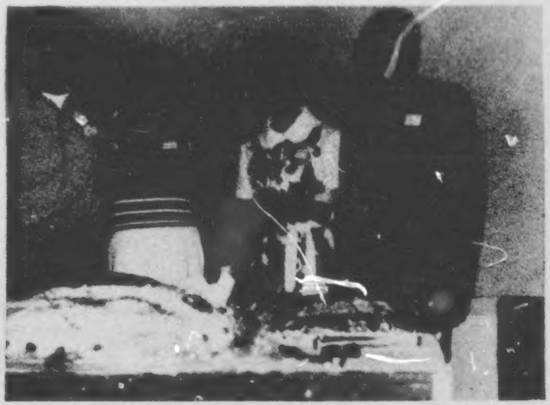
McMaster University, Hamilton, Ontario
University of Calgary, Alberta, Ontario
University of Saskatchewan, Saskatoon, Saskatchewan
University of Toronto, Toronto, Ontario
University of Waterloo, Waterloo, Ontario

LEBANON

American University of Beirut

Conference Candids

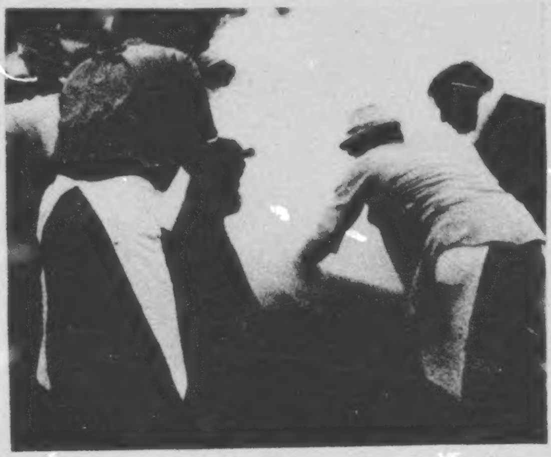
Brown students handle the registration. They are Donna Butler (left) and Beth McDonald.



Preparing to serve at Sunday night get-together are Mr. & Mrs. Eric Spencer (Left) and Mrs. and Mr. Robert Wirbel.

Listening to an interesting and informative presentation.

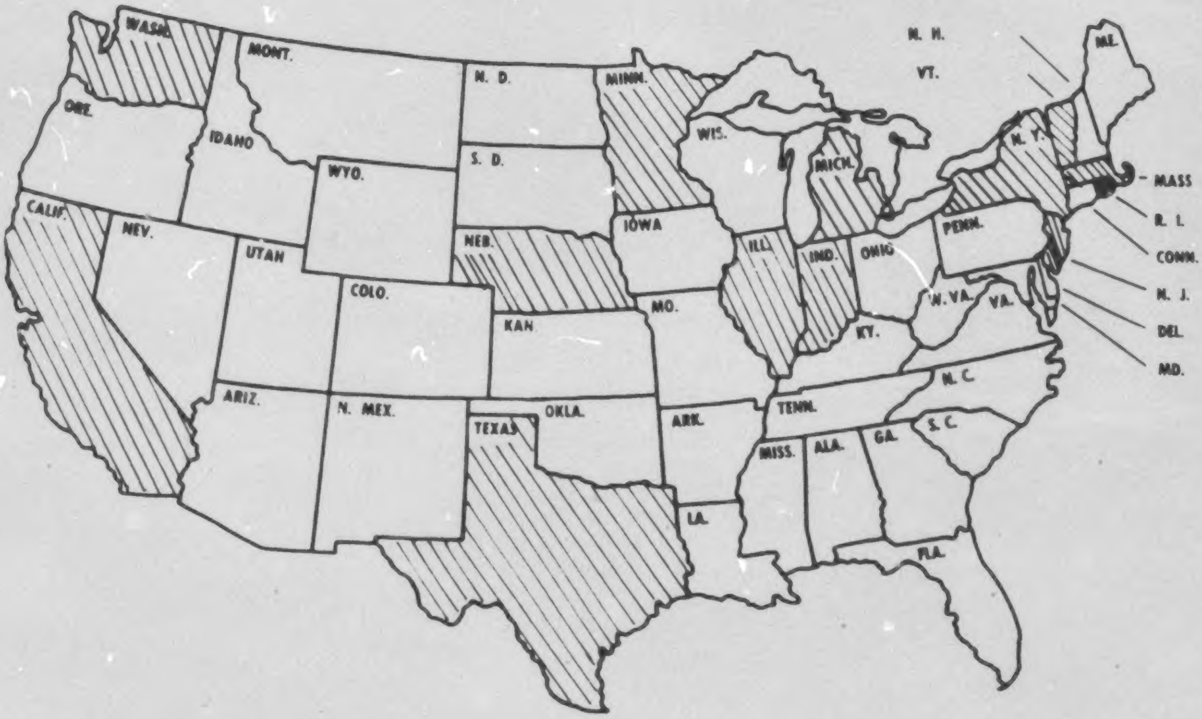
Two of the three buses that transported persons to the Clambake.



"The Clambake" - A job well done.

NATIONAL CONFERENCES ON CAMPUS SAFETY
1954-1972

(Sponsored by: Campus Safety Association,
College and University Section,
School and College Conference,
National Safety Council.)


WASH.
MONT.
N. D.
MINN.
ORE.
IDAHO
WYO.
S. D.
WIS.
MICH.
N. Y.
N. H.
VT.
ME.
MASS
R. I.
CONN.
N. J.
DEL.
MD.
CALIF.
NEV.
UTAH
NEB.
IOWA
ILL.
IND.
OHIO
PENN.
COLO.
KAN.
MO.
W. VA.
VA.
KY.
N. C.
ARIZ.
N. MEX.
TEXAS
OKLA.
ARK.
TENN.
S. C.
MISS.
ALA.
GA.
LA.
FLA.

States and Campus Location

Illinois	(Univ. of Ill.)	1954
Minnesota	(Univ. of Minn.)	1955
Massachusetts	(MIT)	1956
Indiana	(Purdue)	1957
California	(Cal Tech)	1958
Michigan	(MSU)	1959
New York	(Cornell)	1960
Illinois	(SIU)	1961
California	(U of C)	1962

Indiana	(Univ. of Ind.)	1963
New Jersey	(Rutgers)	1964
Michigan	(Cent. Mich. U.)	1965
Washington	(Univ. of Wash.)	1966
Nebraska	(Univ. of Nebr.)	1967
Vermont	(Univ. of Vt.)	1968
Texas	(Texas A&M)	1969
California	(Univ. of Calif.)	1970
Illinois	(U of I. Circle)	1971
Rhode Island	(Brown University)	1972

ROSTER OF NINETEENTH NATIONAL CONFERENCE ON CAMPUS SAFETY

Adamson, W. Clay	Medical College of Georgia, Augusta, Georgia
Anderson, Henry	The Ohio State University, Columbus, Ohio
Beaumont, Arthur	University of North Carolina, Chapel Hill, N.Car.
Blackwell, L. A.	Rice University, Houston, Texas
Blake, W. L.	Duke University, Durham, North Carolina
Blocksom, Roland	Barrington College, Barrington, Rhode Island
Bosky, Walter	University of Missouri, Rolla, Missouri
Brett, Reginald	University of Toronto, Ontario, Canada
Brown, Earle	University of Nebraska, Lincoln, Nebraska
Brown, Glen	Oakland State, Rochester, Michigan
*Browne, Howard	University of California, Berkeley, California
Burns, Everett	Providence College, Providence, Rhode Island
Burns, Joseph	Rhode Island School of Design, Providence, R.I.
Byard, R. D.	University of New Haven, New Haven, Connecticut
Cantrell, Claude	Connecticut College, New London, Connecticut
Clark, Edward	Atlantic Mutual Insurance Company, New York, N.Y.
Clifford, Roscoe	University of Maine, Orono, Maine
Coakley, James	Dartmouth College, Hanover, New Hampshire
*Cofield, Charles	Massachusetts Institute of Technology, Cambridge, Massachusetts
Compagno, Joseph	University of Hawaii, Honolulu, Hawaii
Conn, Kenneth	California Institute of Technology, Pasadena, California
Crooks, George	University of Vermont, Burlington, Vermont
Cummings, William	Providence College, Providence, Rhode Island
Dawson, James	Indiana University, Bloomington, Indiana
*Dempsey, Jerry	OSHA, Compliance Officer, Louisville, Kentucky
Diffley, Raymond	Massachusetts Institute of Technology, Cambridge, Massachusetts
Duda, James	Sangamon State University, Springfield, Illinois
Dunne, Edward	Youngberg-Carlson Company, Chicago, Illinois
Duykman, Ben	Baltimore Community College, Baltimore, Maryland
*J. Pat Eaker	University of Wisconsin, Milwaukee, Wisconsin
Eaton, Chandler	Harvard University, Cambridge, Massachusetts
Eckelberger, Donald	State University of New York, Binghampton, New York
Eigenauer, Carl	Michigan State University, East Lansing, Michigan
Elliot, Saxon	California State University, Los Angeles, California
Faraldo, Joseph	State University of New York, Binghampton, New York
Faust, Jack	Princeton University, Princeton, New Jersey
Fay, Ken	University of Calgary, Alberta, Canada
Fontneau, Nelson	Tufts University, Medford, Massachusetts
Fox, Stanley	Cornell University, Ithaca, New York
Fresina, John	Massachusetts Institute of Technology, Cambridge, Massachusetts
Fritz, James	Connecticut College, New Haven, Connecticut
Giles, Richard	Oklahoma State University, Stillwater, Oklahoma
Gleason, Robert	University of Massachusetts, Amherst, Massachusetts
Goodberg, Jack	Queensboro Community College, Bayside, New York
*Gooze, Gerald	Insurance Company of North America, Philadelphia, Pa.
Green, Jack N.	National Safety Council, Chicago, Illinois
Hall, Ray	University of Colorado, Boulder, Colorado
Hanson, Thomas	Northwestern University, Evanston, Illinois
Hapenny, Charles	Wellesley College, Wellesley, Massachusetts
Harris, Hugh	Elizabethtown College, Elizabethtown, Pennsylvania

Hawley, W.J.	University of Pennsylvania, Philadelphia, Pa.
Hayes, Hubert	Southern Illinois University, Carbondale, Illinois
Hayworth, George	University of Missouri, Columbia, Missouri
Hibbard, Arthur	County College of Morris, Dover, New Jersey
Hickerson, James	University of Missouri, St. Louis, Missouri
Hill, John	Texas A & M University, College Station, Texas
Hoeye, W.D.	Oregon State University, Corvallis, Oregon
Howard, Leroy	University of Maryland, College Park, Maryland
Hudson, Jerry	University of North Carolina at Charlotte, North Carolina
Imad, Azmi	American University of Beirut, Lebanon
Ingram, Harold	Rhode Island School of Design, Providence, Rhode Island
Jones, Jack	Muhlenberg College, Allentown, Pennsylvania
Jones, Robert	University of Arizona, Tucson, Arizona
Jones, Thomas	Purdue University, West Lafayette, Indiana
Keller, David	University of Missouri-Columbia, Missouri
Ketchmark, Ray	University of Illinois, Chicago Circle, Illinois
Kilpatrick, F.J.	University of Iowa, Iowa City, Iowa
Knocke, James	University of Wisconsin, Madison, Wisconsin
*Kuchta, Joseph	Massachusetts Institute of Technology, Cambridge, Massachusetts
Lambert, John	Kansas State University, Manhattan, Kansas
Lapish, Philip	Case Western Reserve University, Cleveland, Ohio
Latorre, Philip	Northeastern University, Boston, Massachusetts
Legg, Lewis	Illinois State University, Normal, Illinois
Leppler, Anton	Elizabethtown College, Elizabethtown, Pennsylvania
Livingston, A.E.	University of Saskatchewan, Saskatoon, Saskatchewan, Canada
Logan, Steve	University of Kentucky, Lexington, Kentucky
Luker, Gary	Workmen's Compensation Board of Ontario, Canada
Maccini, Charles	College of the Holy Cross, Worcester, Massachusetts
*Marcus, Leonard	Yale University, New Haven, Connecticut
Marsden, John	Florissant Valley Community College, Ferguson, Missouri
Mazzata, Sal	Unaffiliated
McCord, Sam	East Texas State University, Commerce, Texas
McGill, Ron	Medical College of Georgia, Augusta, Georgia
Morris, John	Fred S. James Company, Berkeley, California
Morrison, S.M.	Colorado State University, Fort Collins, Colorado
*Munroe, Warren	The Rockefeller University, New York, N.Y.
Murphy, George	Kennecott Corporation, Ledgemont Laboratory, Lexington, Massachusetts
Nutt, Arthur	Pensacola Junior College, Pensacola, Florida
Orsborn, Albert	Michigan Department of Labor, Lansing, Michigan
Osborne, Victor	Yale University, New Haven, Connecticut
Ozaruk, N.	University of Waterloo, Waterloo, Ontario, Canada
Papastathis, Arthur	Wentworth Institute, Boston, Massachusetts
Peterson, John	West Virginia University, Parkersburg, West Virginia
Poppensiek, Neil	Cornell University, Ithaca, New York
Provow, Douglas	Iowa State University, Ames, Iowa
*Regan, Edward	Tillinghast, Collins & Graham, Providence, Rhode Island
Riley, Edward	University of Notre Dame, Notre Dame, Indiana
Robbins, Don	Wayne Community College, Goldsboro, North Carolina
Robertson, Ray	University of Texas, Austin, Texas
Rupp, Earl	University of Wisconsin, Madison, Wisconsin

Schonick, Leon	University of Hartford, West Hartford, Connecticut
Smith, Fred	Deerfield Academy, Deerfield, Massachusetts
Smolen, Joseph	Northfield-Mt. Hermon School, Northfield, Massachusetts
Spencer, Eric	Brown University, Providence, Rhode Island
Stephens, Ray	University of Illinois at the Medical Center, Chicago, Illinois
Stott, John	Mississippi State University, State College, Mississippi
Sullivan, Edward	Babson College, Babson Park, Massachusetts
Sutton, Jack	McMaster University, Hamilton, Ontario, Canada
Syracuse, Michael	State University of New York, Buffalo, New York
Teel, Richard	Endicott Junior College, Beverly, Massachusetts
Temme, John	New York City Community College, Brooklyn, New York
Thomas, Frederic	Howard University, Washington, D.C.
*Vanderveld, Leonard	Baptist Bible College of Pennsylvania, Clarks Summit, Pennsylvania
Vilbert, Benjamin	University of Pennsylvania, Philadelphia, Pennsylvania
Vogt, Fred	Colorado State University, Fort Collins, Colorado
Vollink, Rod	Eastern Michigan University, Ypsilanti, Michigan
Watson, William	Florida State University, Tallahassee, Florida
Wenzel, Frederick	University of Michigan, Ann Arbor, Michigan
Whitaker, Willard	University of Alaska, College, Alaska
Wiggin, Cabot	Northfield-Mt. Hermon School, Northfield, Massachusetts
*Wilson, Rexford	Firepro, Inc., Wellesley Hills, Massachusetts
*Wingstrom, Charles	University of Illinois, Champaign, Illinois
Wirbel, Robert	West Michigan University, Kalamazoo, Michigan

* Denotes Program Speaker

PROGRAM

MONDAY, JUNE 26, 1972

9:00 a.m. **Welcome**
by: Gerald Gooze

9:30 a.m. **Handicapped on Campus**
Charles Wingstrom, Safety Officer, University of Illinois
Charles A. Cofield, Graduate Student, Architecture, Massachusetts Institute of Technology
Sal Mazzata, Former Student, Massachusetts Institute of Technology
Joseph F. Kuchta, Assistant Safety Engineer, Massachusetts Institute of Technology

10:30 a.m. **Coffee Break**

11:00 a.m. **Radiation Hazards and Control**
Howard Browne, Chief, Industrial Safety, Lawrence Berkeley Lab, University of California

12:00 **Lunch**

1:30 p.m. **Safety Management in the 70's**
Harold O'Shell, Secretary, Insurance Company of North America
Ronald W. Wolk, Vice President, Brown University

2:30 p.m. **OSHA — On Campus**
Jerry Dempsey, Compliance Officer, OSHA Louisville

4:00 p.m. **Break**

6:30 p.m. **Banquet**

TUESDAY, JUNE 27, 1972

9:00 a.m. **Inside Fire**
Rexford Wilson, President, Firepro, Inc.

10:00 a.m. **Coffee Break**

10:30 a.m. **Safety and the University Supervisor**
Leonard Marcus, Director of Employee Relations, Yale University

12:00 **Lunch**

1:30 p.m. **Faculty Liability**
Edward Regan, Attorney, Tillinghast, Collins and Graham

2:30 p.m. **Annual Business Meeting**

4:00 p.m. **Break**

WEDNESDAY, JUNE 28, 1972

9:00 a.m. **Safety on the Small Campus**
Leonard Vanderveld, Chief Safety and Security Officer, Baptist Bible College of Pennsylvania

10:00 a.m. **Coffee Break**

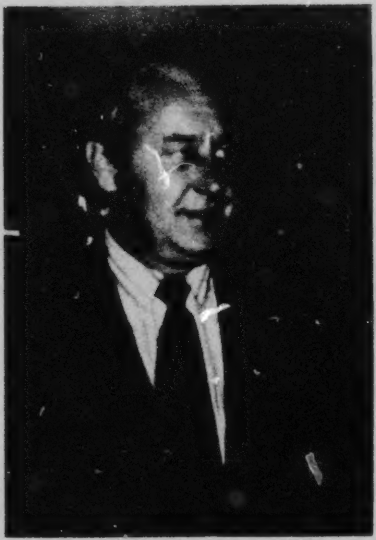
10:30 a.m. **Safety Review of Architectural Plans**
J. P. Eaker, Director, Risk Management, University of Wisconsin

12:00 **Lunch**

1:30 p.m. **Laboratory Safety**
Warren H. Munroe, Manager of Safety and Security, Rockefeller University, New York

2:30 p.m. **Safety Clinic**

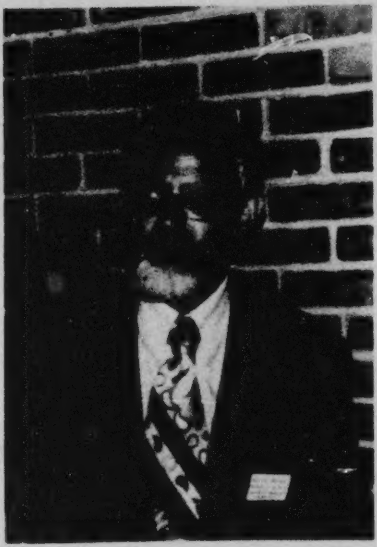
Conference Speakers



Ronald A. Wolk
Vice President
Brown University

Front Row: (Left to right)
Sal Mazzata, Charles Cofield
Back Row: Joseph Kuchta,
Charles Wingstrom

Victor Osborne
Program Chairman



Howard Browne

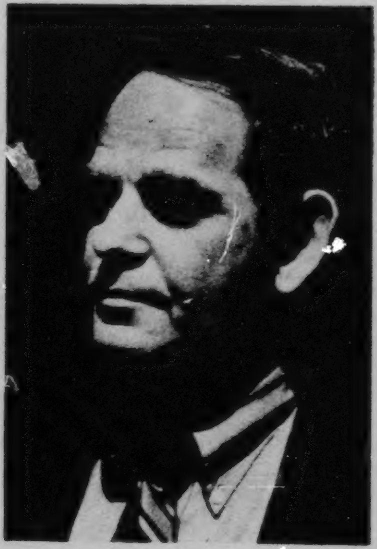
Jerry Dempsey

Gerald Gooze

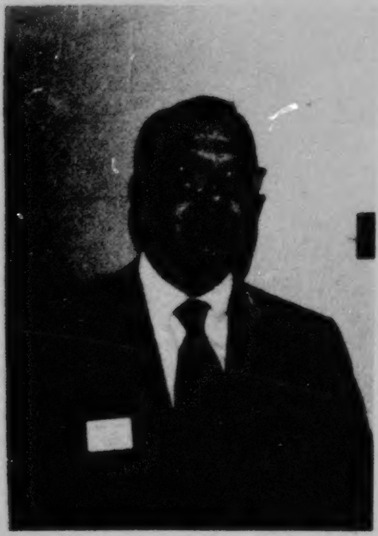
Conference Speakers

Edward Regan

Rexford Wilson



Leonard Marcus



Warren H. Munroe

J. P. Eaker

Leonard Vanderveld

TABLE OF CONTENTS

Page

1. HANDICAPPED ON CAMPUS
Charles Wingstrom.................................... 1

2. HANDICAPPED ON CAMPUS
Joseph F. Kuchta.................................... 5
Sal Mazzata.................................... 6
Charles A. Cofield.................................... 8

3. RADIATION HAZARDS AND CONTROL
Howard Browne.................................... 12

4. SAFETY IN THE 70's
Harold E. O'Shell.................................... 21

5. OSHA ON CAMPUS
Jerry Dempsey.................................... 28

6. INSIDE FIRE
Rexford Wilson.................................... 36

7. SAFETY AND THE UNIVERSITY SUPERVISOR
Leonard Marcus.................................... 47

8. FACULTY LIABILITY
Edward J. Regan.................................... 60

9. DEVELOPMENT AND OPERATION OF A SAFETY PROGRAM ON THE SMALL COLLEGE CAMPUS
Leonard Vanderveld, Jr. 68

10. SAFETY REVIEW OF ARCHITECTURAL PLANS
J. P. Eaker.................................... 74

11. LABORATORY SAFETY
Warren H. Munroe.................................... 80

12. MINUTES OF ANNUAL BUSINESS MEETING.................................... 83

13. OTHER SAFETY MONOGRAPHS FOR SCHOOLS AND COLLEGES.................................... 87

HANDICAPPED ON CAMPUS

Charles Wingstrom
Safety Officer
University of Illinois

The University of Illinois Rehabilitation-Education Program and Rehabilitation-Education Center make it possible for properly qualified individuals with severe, permanent, physical disabilities to pursue a higher education and to benefit from all related experiences which are so much a part of a college education and common to all other students. In providing for the general welfare of disabled students the Program coordinates all facilities, services, and functions for the realization of each individual's vocational objective without the neglect of his physical, emotional and social development. The Program is concerned with all components of the broad scheme of rehabilitation, attaching equal significance to administration, policy, facilities, teaching, counseling, therapies, adapted sports and recreation, transportation, safety, legal aspects, finance, public orientation and education.

GRADUATES: As of June, 1971 there have been 586 graduates including several with advanced degrees. Over half of the graduates are confined to wheelchairs. There has been nearly 100% placement in positions with salaries averaging in excess of $6,600.

ENROLLMENT: Out of a total of 203 students enrolled for September 1971, 87 of the 139 men and 37 of the 64 women are in wheelchairs. If they follow the pattern of past students in the twenty-four year history of the Rehabilitation Program, the results of their efforts will be normal compared with students of any school. Some will fail; many will succeed; some will be honor students.

All physically handicapped students attend regular classes with the general student body. They are enrolled in many curricula in various colleges and divisions of the University: Agriculture, Commerce, Communications, Education, Engineering, Fine and Applied Arts, Graduate College, Law, Liberal Arts and Sciences and Physical Education.

On the extracurricular and social side of campus life they are active in professional, honorary and social fraternities and sororities, and the University bands, choruses, glee clubs, publications, radio and television.

GENERAL FACILITIES

Over 100 ramps have been constructed leading into old University buildings making them accessible for classes, study, activities, recreation, and residence, to all causes and manifestations of physical disability. For the past 17 years all new buildings have been constructed to be accessible to and usable by the physically disabled. All new buildings under construction and planned for the future will independently accommodate wheelchairs. Each student is issued keys to elevators so that once in a building where he has classes, the student has access to all floors. In addition, eight churches of different faiths have been ramped and made accessible.

The Division of Rehabilitation-Education Services is departmentalized into the following units: Administration, Admissions and Records, Federal-State Agency

Functions, Medical Services, Counseling Services, Services for the Blind and Deaf, Physical Therapy and Functional Training, Special Services and Occupational Therapy, Recreation and Athletics, Equipment and Facilities, and Research and Development.

DORMITORIES: Specially designed or modified furniture, toilets and showers allow students with physical disabilities to live in regular dormitories with able-bodied roommates, completely integrated into the residence hall system and completely independent.

PARKING: Use of cars for class attendance is generally forbidden by University policy. For those students who are granted the privilege of using their cars for class attendance, parking spaces are available near their class buildings.

SERVICES

ADMISSIONS: This includes preadmission counseling and evaluation, the collation of psychometric materials, medical materials, school history, and where necessary, the collation of special case materials. These are supplemented by special tests administered by the Center and by physical and functional evaluations in determining the readiness of a student to begin his school work at the University of Illinois.

ORIENTATION: The week preceding each fall semester is set aside for orientation of new students in the Rehabilitation Program. The events of this week are planned to assist the new student in his first registration. Instruction is given in the technique of study habits, on the planning of efficient use of time and on methods of handling personal and medical problems. This is to supplement normal orientation procedures, to account for radical changes in the lives of students upon entering into highly competitive schooling, many for the first time and others following long periods of hospitalization, and to acquaint them with facilities and services of particular significance to the physically disabled.

PRE-REGISTRATION: This is to account for all individual problems such as physical tolerances, academic tolerances and the specific needs of students and to allow for the coordination of all things in their behalf such as relocation of required courses, proximity of classes, accessibility of buildings, transportation, parking, and all administrative and security problems related to these.

MEDICAL SERVICES: This includes medical supervision, physical and medical evaluation, medical consultation, medical counseling, limited medical treatment, and the coordination of extended medical and surgical treatment.

PHYSICAL THERAPY: Required of freshmen and sophomores, and optional with upperclassmen, this includes special exercise, instruction in self-care, functional skills, and re-education on an individually supervised basis. One hour credit per semester is granted. A minimum of three hours a week is required on the part of each individual.

OCCUPATIONAL THERAPY AND SPECIAL SERVICES: This includes training in vocational skills related to the educational objective of the student, adaptive devices to assist the student and which support the student's objectives, activities of daily living and supportive functional training, certain elements of routine occupational therapy, and student projects related to the activities of the Rehabilitation-Education Center and the academic goals of the student.

COUNSELING: This includes counseling specific to our students with particular emphasis on vocational-education counseling. This includes personal, academic and paramedical counseling and preadmission counseling which is very intense and comprehensive and in many cases extends over two and three years.

This also includes the coordination of all existing counseling services such as the Veterans Administration, Division of Vocational Rehabilitation, Student Counseling Bureau, and other counseling services which would have reason to be interested in our students.

SERVICES TO THE BLIND AND DEAF: This includes the maintenance of essential braille texts such as braille encyclopedia, braille dictionaries, foreign language dictionaries in braille, braille logarithmic tables, braille periodicals and the maintenance of braille calculators, braille writers and braille slates. These are used by blind students and by sighted individuals who volunteer their services as braille transcribers. The coordinator of this service is responsible for over four hundred volunteer braille transcribers, tape transcribers and readers. The coordinator is also responsible for group counseling and the orientation of the blind and deaf.

COORDINATION OF FEDERAL-STATE AGENCY FUNCTIONS: This office is responsible for the coordination of all Federal-State Agency Functions in behalf of disabled students at the University of Illinois. This office is also responsible for the coordination of subsidies in behalf of disabled students and in behalf of services of the Rehabilitation-Education Center. It includes a qualified counselor of the State Division of Vocational Rehabilitation.

TRANSPORTATION: This includes the operation of four specially engineered buses that run on regular routine schedules and routes making it possible for individuals with physical disabilities, including those in wheelchairs, to come and go independently, whether it be to class, dormitory, conference, therapy or activity.

EQUIPMENT AND FACILITIES: This includes prosthetic equipment, adaptive devices and a supply of parts needed by our students for immediate repair to essential equipment so as not to interrupt an individual's schooling or participation in special activities. This also includes participation in the planning, coordination and general supervision of all buildings and facilities of the University of Illinois, particularly as regards those things which have been done to these facilities to make them accessible and functional to the physically disabled.

AUXILIARY SERVICES: Any services that tend to make the students' academic and physical efforts on campus more efficient and successful such as dictaphone instruction, IBM electric typewriters, group counseling and the coordination of programs within the community for the benefit of our students.

ACTIVITIES

To supplement the formal therapy program, to allow for experience comparable to the general student body, and to aid the student in all aspects of personal development, the Rehabilitation-Education Center sponsors swimming, bowling, wheelchair square dancing, baseball, football, basketball, archery, tennis, deck tennis, and volleyball.

RECREATION AND SPORTS: This supplements the formal therapy programs and affords our students experiences comparable to the general student body. It is also to aid the student in all aspects of personal development. It includes a variety of adapted sports and recreational activities conducted on both the intramural and varsity levels, including highly organized activities as well as activities of a lesser organization on both individual and group bases.

GIZZ KIDS: The University of Illinois Gizz Kids Wheelchair Basketball Team is a member of the National Wheelchair Basketball Association which has eight conferences and forty teams from coast to coast. The Gizz Kids play in a number of cities and states throughout the country each year and have placed high in National Tournaments.

SELF ADMINISTRATION--GROUP EXPERIENCES: DELTA SIGMA OMICRON is a co-educational service fraternity of physically handicapped students, incorporated under Illinois Law in 1949, organized to promote the academic, physical and social welfare of the handicapped students on campus and all handicapped people everywhere. It sponsors banquets, picnics, social and recreational activities. It explores educational possibilities on a higher level and investigates occupational opportunities. It stimulates and actively contributes to research for the benefit of all handicapped people.

For twenty-one years, it has presented annually the Harold Scharper Achievement Award to the graduating senior or recent alumnus who has exhibited the greatest achievement in all phases of his school and personal life while on campus, and the Harold Scharper Service Award to the student of any class who, during the year, had performed the greatest service in keeping with purposes of the Delta Sigma Omicron. The motto is: "To exercise our abilities to a maximum so as to minimize our disabilities, that we may live most and serve best." Delta Sigma Omicron is an important, integral part of the University's Rehabilitation-Education Program.

HANDICAPPED ON CAMPUS

Joseph F. Kuchta
Assistant Safety Engineer
Massachusetts Institute of Technology

Over the last few years the number of handicapped has been increasing and we can look forward to a greater number in the not too distant future, but are we ready for them? With the passing of time and possible further enactment of local, state and federal laws requiring that public buildings be made accessible to the handicapped, we as safety people are going to find ourselves with another item on our safety schedule or program. The school does not need to provide the handicapped student with an easy life; acts of favoritism are unnecessary and actually contrary to sound rehabilitation principles, however, there should be certain modifications to the extent that the welfare and safety of the handicapped student is taken care of. And this is where we, as safety people, fit into the picture. In Massachusetts all public buildings are required to have access for the handicapped. When we refer to the handicapped, we don't just refer to the person in a wheelchair. We've got the elderly, the heart cases, we've got arthritics, any number of persons. I'm not going to go into details too deeply into architectural barriers; they're there, we know they're three--doors that aren't wide enough, flights of stairs that make it impossible, toilet facilities that you can't get into and out of. At our institute we're trying to do what we can, but here we've got to keep our eyes on architects. In the past year we erected a beautiful building. Every other floor had facilities available for the handicapped. Supposedly the toilet facilities inside the booths were wide enough. The doors pulled out and you had grab bars. Only one thing they overlooked. The door to get into it from the outside was too narrow and this was a poured concrete building. It will be corrected as soon as we can get a few things straightened out. We should look into laboratories. These people aren't just going to stick to humanities; we've had people at MIT in chemistry, Sal here is a graduate in civil engineering. We have students in electrical engineering, so the facilities should bear looking into. In chemistry, for example, some of our labs are a little crowded and we have a number of students working with flammable, explosive material. Where do you locate the fellow and what about the lab bench he's working at? Most of them are waist high. In a wheelchair this is up to his eyeballs. I hope most of you get a chance to look over the plans of any new constructions, modifications, renovations and so forth. The thing to do is to touch base with these responsible administrators and review the plans for the new buildings, renovation and so forth and put in your two cents worth. I'm sure the people that will use them will appreciate it. In the past we've been trying to do something about discrimination as far as race, creed and color is concerned, but here's a group that has been discriminated with, not intentionally, but nobody was thinking about it. We're going to hear from two. One is a former student at MIT and the other is a present student and then we're going to have Charles Wingstrom from the University of Illinois. He will show us some films on what they've done in Illinois. They are the leaders in this country. Our first speaker is Sal Mazzata who spent half of his lifetime in a wheelchair. He went to MIT, got his bachelor's degree in civil engineering in 1963 and his master's degree in 1965. He's presently employed in Cambridge, Massachusetts as a structural consulting engineer.

Sal Mazzata
Former Student
Massachusetts Institute of Technology

I'm going to tell you what it is like to attend MIT before they did anything about improving the situation for people in wheelchairs. When I got to MIT, as far as I could ascertain, nothing had been done to make the place any better for people in wheelchairs. MIT has been used by people in wheelchairs for a long time. When I was there, I met a student whose father had polio and attended MIT in a wheelchair in the thirties. When I graduated from high school in 1959, in Connecticut, I went to the State District Vocational Rehabilitation Service to find out what schools in engineering were accessible to wheelchairs. They didn't know of any. They knew about Illinois, but aside from Illinois, they didn't have any information. I wrote to a dozen or so schools ang got letters about the fact that they were on mountains and on the sides of hills, but that MIT, Illinois and Pitt were O.K. for civil engineering. My father had gone to MIT, so when I was accepted I decided to go. We visited the campus and someone from the housing office showed us the various dormitory facilities. Some of the dormitories were completely inaccessible because of stairs. Another dormitory had no cafeteria facilities, so it meant going outside to get to the cafeteria. The cafeteria was inaccessible so that ruled out that dormitory. One dormitory, Baker House, had a steep ramp. It must have been steeper than ten-to-one because I can push a ten-to-one ramp and I couldn't push this ramp. It was a rather new dormitory and if I had help getting down the ramp, it might work out. There was a cafeteria within the building so that it was possible for me to get food. It had a self-service elevator and the buttons were such that I could get to most of them. The rooms were large enough for me to move around the room with my wheelchair. The bookshelves were accessible and also the clothes closet. I could get under the desk--one of the problems we have with wheelchairs. Most of us have knees that are too tall and we bump into things and these desks were just plank tops, so things worked out well. These rooms had sinks in them. This dormitory was designed before the days of suite-type dormitory arrangements so that it was essentially a set of single, double, and triple rooms with sinks in them and then outside bathroom facilities. At the time the fact that the bathroom was outside and essentially inaccessible to people in a wheelchair was not a problem for me, although it would be now. So we found a dormitory. I think that a way to see how accessible MIT was and the problems I ran into, the thing that would be easiest to do would be to run through a class day and see what bumps and lumps I ran into going through that class day.

So, I'd wake up, get up, and since the dormitory had a cafeteria, there was breakfast provided. When I wanted to go outside there was this ramp which was too steep for me to push so I had to wait for help pushing up the ramp. MIT is a rather compact campus and yet from the dormitory to my classrooms it is about a quarter of a mile for people who were walking, but in a wheelchair it was probably about half a mile. You have to go quite a distance in a driveway through a parking lot and up a driveway onto a sidewalk, along a sidewalk for a while to a place where the curb happens to be low and in a wheelchair you find low curbspots so you can bump down. So you bump down the curbspot and this puts you on Massachusetts Avenue, which is a busy street in Cambridge, Massachusetts., a spot where there's no traffic light. Then you chance the traffic and go into a driveway into the school, down to a loading dock where there happens to be another low curve. It's a low curb, but it happens to be too high for me to push up, so that I would have to wait there and generally someone from the receiving room would give me a hand in that particular door. This worked O.K. during regular classtime hours when people were in the receiving room, but early in the morning or late at night there might not be somebody there and I would have to sit and wait until someone chanced by again. There was another door, also a basement entrance. We use a lot of basement entrances at MIT. There was another door fifty or so yards from this first door that I mentioned, but it only opened from the inside and so to get into this door it either had to be left ajar or you had to attract someone's attention to get in by throwing stones against windows. MIT happens to be set out so most of your classes can be gotten to by staying inside a main set of buildings and the only thing you have to do to get around MIT is to know your way around basements, know your way to different elevators and know the time schedules for the elevators because the operators aren't always there. Sometimes the elevators are locked. There are some private elevators that need keys to get into and to use. Generally, these elevators have keys in positions that you can't get at them in a wheelchair, so you need help from there. Most of the bathrooms at MIT have large enough doors to get through and you can operate the doors. You can get to the urinals without any difficulty. Most of the toilet stalls, however, would be too small for people on wheelchairs. For me, access to the urinals and to the sinks was all I required, so that the bathrooms worked out O.K. There would be quite a bit of difficulty getting lunch from MIT because all the eating places are outside this main set of buildings, but the dormitories provided box lunches, so there was no problem. After the day was over, there was this half-mile push back through the slush and ice of winter to the dormitory. You sit outside again and wait for someone to help you down the ramp and once you're inside your safe haven where there's food, things work out O.K. Now that takes me through a day. Weekends are a slightly different problem. MIT chapel and auditorium are on a little plateau of earth that was created for architectural appearance that has a set of stairs going up to the plateau and then another set of stairs going up to the chapel. The stairs actually didn't create the problem. It was finding someone else, who on Sunday morning might be going out at the same time at the bottom of the ramp. Generally, there's someone doing an early morning laundry down there so I could get out. On weekends there's no food in the dormitories and so the trouble was getting something to eat. The other cafeterias that the school had that remained open during the weekend weren't accessible to wheelchairs. This required either getting hoisted up some stairs to one of these inaccessible stairways, or eating Campbell's pork and beans out of a machine, or having someone bring food back to the dormitories which created a problem. If you wanted to use the MIT auditorium, it too is up on this plateau. The way to get at it, at that time, was to go down a big ramp into the basement and from the basement take a stage elevator up to the stage, right into the stage and go down a couple of stairs. That was the least work solution to get into the auditorium. If, in fact, you wanted to go to one of the movies in one of the MIT lecture halls, you had to go that half-mile route back through those doors and now it's the weekend and it's dark. There's nobody in the receiving room and so there is a chance of getting in one of these doors.... These doors are not left open all the time; they're open during business hours. And during non-business hours they're locked. So you have to chance getting someone from the inside or else go with somebody who goes in a normal door and can go back and around and open the door for you. The library is on the other side of the campus from the dormitory that I stayed in. Distance is primarily the problem. Most of the entrances at MIT went through this one set of doors, so that as long as I could get in there, the library was accessible through basements--quite a ways away--.

but accessible once you got in. The infirmary was accessible through that same set of doors and the infirmary had it's own elevator, so that worked out O.K. The doctors' offices were accessible.

Civil engineering had their own computer and that was accessible, but the school's larger computer had a couple of curbs in the way. Quite often when you use computers you're using them in the evenings and on weekends--strange hours. If you want to get up the curb, and you can't hop the curb, you sit and wait until someone goes by, if there are no ramps. At that time there were no ramps on the MIT campus. They were put there for someone else's convenience, not wheelchair convenience. If at MIT you once were interested in joining any extracurricular activities, generally, these were in a building on the other side of campus. The activities were stuck off into offices and all kinds of nooks and crannies in this building. These were pretty inaccessible. My experience at MIT required a lot of patience, primarily because of these curbs. Making MIT accessible would not create any kind of great problem because there are mostly single curbs in those places. There were buildings that I didn't even consider were part of MIT. They weren't part of my MIT because of great quantities of stairs and, I preferred not to get hoisted up those stairs. It hurt my dignity a little bit or something, so I would stay out of those buildings. It is possible to stay at MIT with only a few curbs in the way as long as you can find a few doors open at the right time. Charlie here is going to tell you (he's at MIT now) what things he thinks that MIT should do to improve its immediate physical situation for people in wheelchairs.

Charles A. Cofield
Graduate Student
Massachusetts Institute of Technology

When I arrived at MIT, I posed a little different problem because I was a commuting student for the first two years and this posed problems of parking facilities and entrances other than what Sal was using, so we had to start combining services of medical department, parking facilities, and parking programs. Campus patrol had to be more aware of entrances and parking cars and people not shutting off my car from access. Then I moved on campus and I found that even though the campus had been working to change the structure of the campus, there were still a lot of changes that needed to be made. I was living in a dorm that was supposedly rehabilitated with the thought of the handicapped in mind and they went by a specification guide that you can obtain from the University of Illinois. Through this specification guide I found that a lot was lacking in terms of operation use. They had widened doors and hallways. They had kitchens in rooms and the kitchens weren't really large enough. They had appliances within the kitchen that you could not use because of the placement of these appliances and the buttons on the appliances.... They had even put in a shower, but they had a curve and the three foot distance; you couldn't use the shower. They had an elevator to get to the rooms, but they only had one elevator, so, in case of an emergency, you were stuck. Sometimes the elevator wasn't working and the elevator operators were on strike a lot. That meant that I missed a lot of meals and on weekends especially.

I'd like to talk a little bit about what was done when I arrived to make the campus a little more useful and what we're doing today. It was sort of a short-range thing because I really applied late and was accepted really fast and the school didn't know. When I arrived in September they figured that things were going right because they had said that they had a few students that were on wheelchairs. But they didn't know that I was going into architecture, which meant that it was a completely different part of the campus and that I would be traveling to different parts of the campus. Architecture, for instance, is in a building... and architects like to do multi-level things and their department is multi-leveled. This posed a problem for them because they had to go back and rip out a lot of their stuff just to make it usable to me.... I tried to outline short-range things that basically any campus could do if they were trying to make them accessible and how we sort of looked at it.

I guess most students coming as undergraduates try to get a basic education just in the liberal arts and so there's a liberal arts curriculum that can be sort of outlined. And, if you can define a path of circulation, a major route that everybody can take and check along with the specifications that are set up. This would be helpful. Try to make them usable without any level changes if possible and try to maximize their use by not putting in any obstacles, such as level changes, door knobs, doors, heavy doors, especially. Fire doors pose a great problem. When you come to the end of small corridor and you have a fire door which opens toward you and just has a knob, you don't have any distance to jog the chair alongside the door to get it open. Swinging fire doors are a lot of problem because students like to run through the corridor and if they're not glass-shielded, they never know you're on the other side, you might wind up with a lot of broken toes.

MIT, as was said, is a compact campus and you can get around a lot by traveling through the basements, but that sort of leaves you socially castrated from the rest of the group. I was never able to travel with my class because I would always show up at a class and disappear and show up and disappear and nobody ever paid any attention. You never get to know any of your classmates. It's sort of a lonely life and recently with a few changes that are being made, now I do travel. Now that class is over - I'm writing a thesis and doing things. It's no more of a chore. But with other students coming in there are problems of going to class and traveling through the basement when at night they have to go back for labs. Most of the labs are at night, and most special classes are on weekends. When you travel through the basements on weekends and it's dark and the mechanical crew isn't down there to give you any assistance there is sometimes a lot of junk laying around--obstacles which get in the way, like heavy transformers, gas pipes, etc. A lot of times they leave ceiling planking, roof tiles.

I think that the security patrol needs to travel through a lot more of the university. Maybe you could make out a list and check out each department to make sure that they keep up and clean up after every crew detail. Usually if you get into a building that has a few stairs, a lot of times all the courses are given on the first floor for just the basic education. Just a small wooden ramp on the outside with maybe a one in ten pitch, as Sal said, or one in twelve, which is more preferrable, would do and then, with the assistance of a few students, a student could make it. It takes a lot of combining of services of physical plant, safety office and medical department, and admissions office. The admissions office really has to be on their toes when they admit the student because he's going to run into a lot of problems in just the first week. And that first week that he gets behind will put him three weeks behind later. He never catches up. It's a problem--always running.

Long-range aspects that we sort of have in mind are the following: We have a student center which we can't really use. You can go there and eat, but that's about it. You have a bowling alley which you can't really use because the bowling alley is on a platform and you have to be hoisted up and down the platform. It becomes a problem. You don't really have friends because when they take you they're going to hoist you up and down. They find it a hassle and it becomes tiresome on their backs.

When you're planning campus facilities you can plan them without the use of multi-level things. Have architects that are planning things justify why they're making all these level changes. A lot of times it's just for their own inspiration--because they got tired one night or they like to see a lot of lines on the paper they just put a lot of stairs in. It really serves no just purpose and a lot of times it's more inefficient. It hurts your economy by adding a lot of extra concrete just to build those stairs. They build them up then they build them back down to get to the same place and for what purpose? Overhead lighting has an effect since we're not five feet six like normal people usually are. The light is not as direct any more and by using the same sixty watt bulb, it always looks dim down here. By having lights that are reachable--that are maybe four feet six or five feet seven with chain cords--or even wall that you can bring your own light and plug into...a few extra sockets would make it a little easier.

I found by moving in a dorm (I lived in a single room) and living in a room that was a little extra large I was better off. Everyone wished they could have it, but I felt that I could have been a little better off in a double, maybe a double that was a little larger. They always wondered why my bed was never made up. You can't get around the bed. The room was eight by twelve. You can't get in it and make the bed because you can't adjust anything.

The best type of windows are sliding windows, but if you're going to have sliding windows, don't put the levers five feet six above the floor because you can't unlock at five feet six. It would be better to make a lower ledge in that room. Anyway, the windows were so high that you only get a view straight across the chest and you never get to see below.

In our approach recently...we are thinking of designing the use of the campus for everyone, not just designing for the handicapped. If you're making a design, you can justify its use without designing a lot of pretty little stairs and obstacles like useless sculpture that they stick in the way sometimes and corridors, fancy door with fancy steel knobs that you can't grab or doors where the lock is so close to the doorknob that by the time you try and squeeze your wheelchair in the corner and get to the doorknob and try to turn the key...you know, it creates a little problem. Putting doors at the end of corridors also create problems. The idea of not being able to go and see movies or the way you have a lot of lectures like this when I'd have to go in the basement. If that was always locked, then I'd probably miss a lot of lectures at nine in the morning. Or sitting up there I may not be able to see the board because some of us wear glasses and some of us don't. You like to be down close and all the time they don't have microphones in the lecture halls. On weekends when there was no one there, especially when it was snowing, you were just stuck; you couldn't go anywhere.

We always had to cross the street where there's no street light and it's on a major autoway that's like a highway. Everybody says, "God, I'd be scared." They always grab the chair and say, "Aren't you scared to cross here?", but it's the only way to get across because there are two six inch curbs. You couldn't get into that building there anyway because there are forty-eight steps. I've been taking a survey and I've found that most of the people that work in the building find that they would like less steps and less vertical circulation because they have to truck wheelies through. A lot of the professors like to have office parties and they bring you big carts of coffee and donuts. The people that have to push these things through have to lug them up and down stairs. The nurse's office then finds that they have lots of reports of backaches and slipped disks.

We've found that by cutting out and putting all these big ramps in, that even the people who deliver mail have found it more efficient. They don't have to take back routes and the mail gets delivered faster and they pick it up an extra time a day now. Just developing a more combined unity on the campus of all your services and planning would make for a more useful place.

Graduation is always put up on a podium. When it comes time for you to graduate nobody sitting up there on the podium wants to lug you up there to give you your diploma. Either you build the corridor which is the same height as the podium or you don't build a podium at all. This would really help.

(NOTE: This presentation was taken from a tape recording.)

RADIATION HAZARDS AND CONTROL

Howard Browne
Chief, Industrial Safety
Lawrence Berkeley Lab, University of California

The Lawrence Berkeley Laboratory has two campuses, one at Livermore and the other at Berkeley. The Livermore is the one that's associated with weapons research while Berkeley is involved with pure research. I'm speaking from my experiences with the Lawrence Berkeley Lab since 1948. I joined the lab with the group that was concerned with radiation safety, but since 1961 I've been asked to work in the field of industrial hygiene, industrial safety and fire safety. My talk is concerned primarily with the field of industrial hygiene. As was indicated, the talk was originally billed as "Non-Ionizing Radiation," but in talking it over we decided that perhaps we would not be so specific because there are ionizing radiations that we're all interested in. So I've elected to talk about the whole of the electromagnetic spectrum, which is quite an order in the time remaining. We might subtitle this "A Guided Tour Through the Electromagnetic Spectrum" with a touch on mechanical vibration and noise. So you're going to hear the whole gamut and possibly, if we can rush through this in order to get to the questions, perhaps we can hit on more points that are of interest to you. So I'm going to run through this pretty fast and I hope that you will take an opportunity to take notes...

In 1961 Westinghouse Corporation published a chart of the electromagnetic spectrum. It's probably the most well-known chart and certainly the most colorful one. It packs a lot of information and concerns itself with the electromagnetic spectrum starting clockwise on the left with transmission frequencies and audio frequencies through radio waves, micro-waves, the infrared, the visible spectrum, which, as you see, is only a very small portion of the electromagnetic spectrum, through ultraviolet, X-rays and gamma rays.

This is a simplified version put out by General Electric; I don't like to play favorites on the electrical appliance corporation, but this shows in reverse direction electric wave, radio waves, infrared, visible. Visible in this case has been expanded - ultraviolet, X-rays, and gamma rays. As you see, there are slant lines between these because it is a continuous spectrum. You cannot say that the photons that are involved in electromagnetic radiation are different in the case of radio waves than gamma rays; they are the same photons, but just of different energies and frequencies.

I think in order to talk about wave phenomenon we have to associate ourselves with what it is. Our most familiar exposure, of course, is the still pond where we drop a rock, or a friend, or a toe and waves are generated. These are generated out from the source of energy, which is, say, the rock, and they move at a certain velocity, have a certain amplitude and if we measure the time between two peaks, we have what is called the period of the wave.

The frequency, then, is the reciprocal of the period. In modern-day terminology, instead of using cycles per second, we have chosen to use hertz which means cycles per second.

The simplest example of the representation of wave motion could be a clock pendulum in which the frequency is one and, in this case, we're measuring the amplitude from the rest point which describes the typical sine wave phenomenon.

We talked about the frequency, but we also have to concern ourselves with wave length, which is the distance between two troughs or two peaks. The wave length is equal to the velocity of the wave front divided by the frequency. The general terminology for wave length is lambda. In the case of electromagnetic spectrum, "c" represents the speed of light, which is $3X10^{10}$cm. per second, and frequency being in hertz.

Lambda is equal to c/f (c over f). For an example, if we concern outselves with a hundred meter band in radio - this is the 3 megahertz band - and if we're determining the wave length from the frequency, it would be $3X10^{10}$ divided by $3X10^{6}$ which is $3X10^{4}$ cm. There are 100 cm. in a meter so this turns out to be the hundred meter band.

I've elected to talk about mechanical vibration and noise in order to put some of these concepts more firmly in your mind and as you no doubt are aware, in the case of space vehicle launching, there is a problem of vibrations which go down to very low frequencies which we call infrasound. The infrasound energy is more or less equivalent to sound energy and it's something that you feel rather than hear. This indicates that there are two sources, one from the exhaust phenomenon and wakes from protrusions and so forth and then the higher velocity factors where you get into the very high frequencies.

The human frame has resonant frequencies. These happen to be for the seated human. From 4 to 10 hertz, for example, if the amplitude is great enough, you can cause pain and discomfort. At 10 to 30 hertz you get head displacements which may cause teeth chatter and vision degradation. I'm using this to point out that the resonant frequencies are a function of the size of the object that is being exposed to the vibrational energy.

This is another representation of the phenomenon. For example, at 200,000ths of an inch and at about 30 hertz, you can just perceive vibrations, but at 30 hertz at a mil. - a 1,000th of an inch - you get into the annoying range and when it is raised to about 3,000ths, it will actually become painful. In some of your research facilities you may be faced with problems associated with vibration where the infrasound problems are not apparent to you, but you may find out that people are getting headaches, that they're suffering from fatigue and so forth because you have large moving equipment that can provide this sort of vibration and these amplitudes you should look into.

We've concerned ourselves with these lower frequencies...in this range here, up to 30 cycles per second. From 30 up to about 20,000 cycles per second you have the audio range and we would like to talk about this in terms of the problems of noise.

I'm sure you're familiar with the fact that sound is due to pressure disturbances in the air - this is a very crude representation of it where the dots represent the molecules of air. There are rarefactions and pressure areas, but in pure tones these can be represented as a sine wave.

To talk about the problems of sound we also have to talk about the ear because the ear is a receptor of sound and to the two extremes are the threshold of hearing and the threshold of feeling and above that, the threshold of pain. As you see, the ear, at very low frequencies, has relatively low sensitivity...when it comes to the threshold. There's a peak around 3,000 to 5,000 where you have very high sensitivity and then it rises again as the frequency reaches 20,000 and above 20,000, we don't hear. Some animals do, but we don't perceive this energy as sound. In the case of threshold of feeling, this is flattened out somewhat. I'm talking about this because we're going to discuss this problem of measuring. As you see, it's more or less flat at the high levels.

I've talked about db. I think it's important to define what a decibel is. There is an error in this slide. It should read .0002 - 2 ten-thousandths of a microbar represents the average threshold of hearing for noise and this is represented by the energy density of 10^{-16} watts per square centimeter. This is very, very low energy. It's been said that 100 watt source, if you discount the attenuation of air and there was a lack of noise pollution, could be heard at, I think, about 2,000 miles, although at three feet this would be painful. So you can see what the ear can stand.

To understand the concept of decibel...the decibel is actually ten times the log of the sound/power ratios. We've established a threshold ratio of three zeroes two(2) microbars and that is considered to be zero decibels, the threshold of hearing. If a sound/power level is ten times that, that would be two zeroes two, then it would be considered 10 db.. A million db., a million times the threshold of hearing , would be 60 db.. The log of a million to the base ten times ten. Likewise, you can express intermediate values. A ratio of 200 over the threshold would be 23 db.. You can express values below the threshold with negative db..

We showed the ear's perception of sound at very low levels and at very high levels and in order to match the ear's reception of sound with that of the instrument which normally measures directly linearly in terms of the energy it receives. There were established three curves: the A curve for low levels of sound, the B curve for intermediate, and the C for higher levels. Unfortunately, OSHA and others have chosen to use the dbA for all of their measurements. It's necessary, then, to keep this in mind...When you measure sound with a dbA meter you are overemphasizing the lower frequencies and if you use the C weighting, this would give you a more flat response in terms of their frequencies.

This is the table that you find in the OSHA which relates the permissible noise exposures, the sound level in dbA to the duration in hours per day. The present level is established at 90 dbA. Levels above that can be sustained without protection to the ears if the exposure time is reduced. They also have a specification for impulse or impact noise. It should not exceed 140 dbC and the impact noise is generally considered to be any noise that doesn't sustain for longer than one or two seconds. They also specify that 115 db. is the maximum that any person can be exposed to for a quarter of an hour or less.

This is an illustration of a typical noise meter. It has the a, b, c weightings... the pushbuttons here. It has a scale that changes depending on the noise level that you are concerned with. In this case, it's set for the range from 60 to 70 db..

There are certain noises that are flat in response. For example, we hear the term "white noise." White noise generally contains all of the frequencies that we can hear in approximately the same proportions. White noise is the "hiss" you hear between FM stations, noise usually associated with rushing air. There are places in industry and in laboratory situations where you will be measuring primarily a single frequency or a mixture of one or more frequencies. In this case the dbA rating may be in error, so the ANSI specifications, which are included in OSHA, have provided an equivalent "a" weighted sound level. In this case, then, it is necessary to use an octave band analyzer and plot your data according to your various octave bands on this grid. The point of highest penetration will determine the equivalent dbA. This also you'll find in the OSHA specifications.

A typical portable device for making octave band analysis is this B and K meter. The lower section is the analyzer that allows you to select out by filters the octave band you're interested in and read out on the meter face at the top section. This knob in this region here can also be set for the a, b, and c readings and also slow and fast response. If you have a widely fluctuating noise and you want to try and average it, you use the slow response. If the noise is fairly stable in its level, you use the fast response to discover if there were excursions. You would also use the fast response in estimating if there were impact noises that you should concern yourself about.

Let's talk about noise control measures. Certainly, the first step is to reduce the noise level at the source by design. More and more, we are coming around to putting more specifications into our purchase order requirements. If you buy equipment that is noisy and have to add attenuating cover then you're just wasting your money. You should be aware that you can specify noise and that the manufacturer that puts out noisy equipment is actually in violation of the noise control orders. If you do have noisy areas because of combinations of noises, for example, where each individual noise maker is sufficiently below the 90 db. level, you can exclude the boys from those noisy areas or you can provide earplugs or muffs to attenuate the noise - this is a crutch approach - and then you can also limit the exposure times. You should try and get the noise designed out of the system.

Earmuffs are generally considered to be the most effective attenuators, but you also have to consider, in using earmuffs, how effective they are for various frequencies. Generally the higher frequencies are most easily attenuated by any sort of device and the earmuffs do have better attenuation for the lower frequencies, but it's important to know what your noise spectrum is so that when you put an earmuff on it will attenuate the frequencies that are contributing most to this noise level.

Now we get into radio waves. We will latter talk about microwaves, but we are making this distinction right now just to simplify this talk. The radio waves are mostly sources of heat and we most often think of them in terms of induction heating, that is, heating caused by fluctuating electromagnetic exposure, in conducting materials and dielectric heating in non-conducting materials.

The biological effects of radio waves below 150 megahertz whose wave length is 200 centimeters, the body is transparent. Two hundred centimeters, as you see, is roughly six feet so that when you are exposed to wave lengths in excess of six feet, you will not suffer any damage. Between 150 and 300 megahertz which we have arbitrarily designated here as radio waves, you can get damage by overheating, primarily to the internal organs. This is a hazard, particularly with high powered devices that are used, say, in your engineering labs for metallurgical purposes. You need the control.

The most usual control is of course by screening, by putting some conductive material that attenuates the radio waves before they can reach any humans. It's also important, according to the National Safety Council, to prepare adequate operating instructions, and these should be posted, so that when equipment is turned on and off you know what the complete operating cycle should be. Emergency procedures and maintenance procedures should also be posted.

Let's talk about microwaves. This concerns the region of microwave ovens.

Microwave radiation is from 300 megahertz up to 1,000 gigahertz - "giga" is the term that's now used for, I think, "beva"; our bevatron, for example, is really a gigatron in the new terminology. This is from one meter down to 3/10ths of a millimeter. Very often these are called the millimeter or submillimeter waves.

The biological effects of microwaves above 10,000 megahertz...you primarily have skin effects and maybe some absorption in the skin and some heating. This is less than three centimeters. You do get this effect at 10,000 megahertz. From 10,000 down to 3,300 megahertz the skin and eyelens - and the eye is particularly susceptible in 10,000 down to 1,000 - and it's in this region that they have discovered that there have been cataracts formed particularly in the military establishments with radar and so forth. At 12,000 down to 300 megahertz we have this problem of overheating of internal organs.

This is a comparison of U. S. standards with the Russians' and the Czechs'. The Russians have set standards considerably below ours; it's a factor of a thousand actually for continuous exposure. The Czechs are someplace in between.

This is a representation of a typical microwave meter. Each of these has been calibrated for the frequency that is of concern. You will have a different size wand and comb, depending on the size of the wave length.

Let's talk about infrared. Infrared are heat waves and we generally associate them with heat but they're actually again part of the electromagnetic spectrum and they are converted to heat when they are attenuated by our body or by some other body. The black body concept you see at the top of the slide indicates that there is a standard bell-shaped curve for each temperature and it encompasses, say at twenty degrees, it encompasses a little over one of these decades, but at 6,000 degrees, for example, it spreads into the ultraviolet and the light. There is a black body temperature and each of these black bodies has a characteristic...a spectrum of its own.

Zinn (?) and his co-workers at Los Alamos have been doing work with radiation, black body radiation, in terms of exposure to nuclear detonations and they've established this exposure time curve in seconds which levels out at $2X10^{-7}$ watts per square cm. for 5,000 degrees Kelvin - that's your absolute centigrade - and 15,000 Kelvin is dropped by a factor of 75% down to $1\ 1/2X10^{-7}$.

This is on the basis of a five-degree rise in the eye. This is just to show the range of infrared from 300 microns down to 7/10ths micron - a micron is 10^{-6} meters or 10^{-4} centimeters. The problem in talking about these spectra is that they keep changing the rules so far as the designations are concerned - microns, nanometers, you name it, they've used it in terms of naming the frequency.

In the cases of safe levels, for example, the continuous wave laser in the infrared, the standard has been set at 1/10th of a watt per square centimeter for the skin and 1/10th of that for the eye. We showed earlier that for black body radiation where you have a wider spectrum - it's called broad band exposure - it's down by a factor of 10^5 in the case of the eye. You will actually feel pain at radiation of 10 watts per square centimeter.

One of the concepts that we have to get across in protecting from heat is this heat/stress idea. The wet-bulb globe temperature is the one that has been used by the American Conference of Governmental Industrial Hygienists; the WBGT which combines the wet-bulb, the dry-bulb and the globe temperatures. Globe temperature is determined by synthesizing a black body, putting a thermometer inside a black-painted globe.

For outdoors with sun, the ACGIH has used this weighting where you use 70% of the wet-bulb, 20% of the globe temperature and 1/10 of the dry-bulb. For indoors with no sun, you neglect the dry-bulb temperature.

Measurement...You're probably most familiar with a snooper scope, but this device here does a similar job and you can actually measure visible and db. radiations as well.

Now let's talk about the visible spectrum. The visible spectrum we're most familiar with because this we can perceive and the eye is sensitive to color - a very small portion of the spectrum - the ears can perceive about ten octaves in terms of frequency, the eye is less than one...from 4/10 to 7/10 microns.

Very often you hear the term "Angstrom" - these are 10^{-8}cm. and now a lot of the specifications that you come across are in nanometers, 10^{-9}meters. So now in specifying filters for meters you will see any one of these, but most often now in nanometers.

There are two types of sight that you have, one is the scotopic where your rods are concerned - these are the very low levels of light where you don't actually see color...You see things in grey. The French say "At night, all cats are grey." Then, there are the higher levels where the cones take over and you do see color. You're able to perceive these wavelengths from less than 400 in the scotopic to about 700 in the photopic.

This is a typical photometer which measures in foot-candles.

Lasers can be used, in this case for making micro-holes and here we must protect against reflective radiation.

Everyone can get a laser - they come in kits now and this particular one has a milliwatt at 6,328 Angstroms.

Laser goggles are useful, but not very because the less milliwatt levels generally do not present too much of a problem and anything above that you're apt to get degradation of the goggle when the laser beam hits it.

From the visible we go to the ultraviolet.

Ultraviolet is 10 nanometers down to 400 nanometers. Ultraviolet is created by high-temperature objects so we can also express this in degrees Kelvin, from 10,000 degrees Kelvin to 30,000 degrees Kelvin.

Ultraviolet sources...solar radiation is one source. But arc processes such as welding and plasma deposition of metals and, of course, the discharge lamp - the low-pressure ones which give line spectra through the high-pressure ones which give broad-band continua and, of course, there are a few lasers also in the uv..

This is a representation of the reception of uv. light by the eye; certain frequencies are called actinic. It's these that you have to concern yourself about and which make uv. monitoring difficult because it peaks very suddenly at one frequency.

This is around 300 microns. This shows the sunlight...the curve on the right. And the erythemal response which is this red curve with a high peak around 300 and then the meter response. It's this little triangle in here that the SST is giving us problems with because as the SST...if it does become operational, this will move out and since this curve is so steep there will be increasing amounts of uv. reaching the earth's surface which is supposedly going to increase skin cancer and may cause damage to the earth's vegetation.

The biological effects of uv. are the sunburn.... There can be eye burns by the absorption in the outer portions of the eye.

There can also be chronic effects - the farmer's skin, the seaman's skin, or skin cancer. Nowadays the females are concerned about aging; they discovered that some tans are pretty, but that they're not so good in terms of skin aging. Then there are the indirect effects such as the bactericidal effects.

The ACGIH has also prepared a proposed threshold limit value for ultraviolet radiation and this is somewhat the same curve that we saw before except they don't show the flat portion that we saw in the previous part. The AMA has one point for the germicidal lamps.

There are some of the exposure recommendations - for skin, 2×10^4 watt/seconds per square centimeter and for the eye 1/2. These are power densities rather than energy densities. The American Medical Association has set a 1/10 of a microwatt per square centimeter per twenty-four hour day.

This is a typical photometer that can be used for measuring uv. light. In order to find out what the spectrum is you have to take a series of readings by introducing filters in front of the photometer.

Personal protection...Eyeglasses are very effective. Most of our glasses that we wear for helping our vision also protects us. They don't need tints, in other words. Protective clothing you're familiar with. Sun-screen creams are also effective.

Now let's talk about X and gamma rays. These are the very short wavelengths, but they're still the same thing we were talking about before in radio waves.

These are what we call the ionizing radiations.

To get some idea about ionization...An incident photon, a primary gamma is going to strike an electron, an orbital electron, in an atom. It displaces the electron from the atom and then the atom is short one negative charge; it becomes a positive ion. A degraded gamma of low energy leaves and the electron is released at very often high enough frequency so it also can cause ionization.

When talking about ionizing radiation, we have to use electron volts because we are concerned with electron measurements. An electron volt is that energy required to displace one unit charge, one volt.

X-ray generation is sort of the reverse of what we saw before for photoionization where you accelerate electrons in an X-ray tube and they strike a target and when they stop, this stopping radiation leaves the electron as X-rays.

This is a representation of the amount of gamma flux or X-ray flux - gamma and X-ray are one and the same thing; it's just the source or the energy to give one Roentgen per hour. It has a sort of a seat or a flat portion and a very steep portion.

For the worker there have been exposures set as maximum. There is an error in this table also; the maximum corresponding dose in rem - Roentgen equivalent man - is considered to be 5 rem per year. For skin you're allowed 30 rem and for the extremities, the hands and feet, you're allowed up to 75 rem. These are the corresponding figures for a weekly dose.

Most familiar probably to you is the pocket dosimeter. The pocket dosimeter is a charged device in which these reactions of the photons occur causing ionization and the ions once inside cause discharge of the device and you can either read it directly with the telescope built into the tube or with a reader where it measures the charge on the device.

A survey meter has to be tissue equivalent in order to measure neutrons, X-ray, and gamma photons. It measures rem rather than Roentgen. Roentgen was designed to measure ionization in air.

Individual exposure per year has been set at 1/2 rem, 1/10 of that set for the working population. Averaged over thirty years of the worker's procreative period it should not exceed 5 grams to the gonads. This is the 170 millirem per year that Kaplan and Bachman have been disputing about...Sternglass also.

We put all this together in a big fat mess, but...the gamma and X-rays, that same sort of step occurs. I've pointed out how immediate effects in terms of gamma rays occur at about 10^{-2} watts per square centimeter. If you...for soft X-rays, if you expose the skin for an hour and it receives 2,000 Roentgens, you'll get erythema in several hours. You can do the same thing with four exposures, 500 Roentgens per week and you'll get erythema, but we don't know how much we can fractionate it before we no longer get effects. This is the business of the linearity of radiation exposure. We've plotted the eye effects in the green-dotted lines and we show the ACGIH uv. curve as being a very steep V-shaped one. We have also plotted that little segment there for Zinn's data for black body radiation which point upward. Then the data for continuous wave lasers and radio wave energy in the U.S.A. all fall on the same curve. For continuous wave infrared, for visible, we have a factor of ten above. The Russians down below are down by a factor of a thousand. We synthesized a wavelength assuming that the body is travelling at the speed of sound for mechanical ...We've shown that mechanical perception and mechanical pain figures and the OSHA 90 db. in terms of exposure. Let's skip over the next two slides.

Those two were to show that we still have to consider this business of resonances. Somebody has characterized it as the quantum ladder. At certain wavelengths, natural molecules, such as the DNA for example, are subject to damage. They cannot exist at high levels of radiation above these frequencies. Molecules at still higher equivalent temperatures, atomic excitation and nuclear excitation, elementary particles and sub-particulates that occur with very high-powered accelerators, but there seems to be a general trend if we plot all of the eye data, in this downward direction and, moreover, Zinn's data for broad band spectra do establish a curve, a slope which turns out to be that the power density, on a conservative basis, turns out to be 10^{-6} times the wavelength in centimeters to the 6/10 power. Now this, then, hits the 170 millirem period at this point here. If you want to be more conservative, you can move that up by a factor of 10^4 and operate in this range, but the resonances do exist and to say that we can set limits that will apply to the whole electromagnetic spectrum is not a reasonable one.

(NOTE: This presentation was taken from a tape recording.)

SAFETY IN THE 70'S

Harold E. O'Shell, Secretary
Policyholders Service
Insurance Company of North America
Presented by Gerald Gooze

We are sitting on the EPI Center of the greatest information explosion the world has ever known. I was reading an article titled "Balance for the Tilted 70's" in which the author said "new knowledge is developing so rapidly that scientists are alarmed at the prospects of storing this information because even high speed tapes and microfilm may run us out of room. In fact, some are now experimenting with storing data on molecules, if successful, you may one day carry a sugar cube sized crystal on which will be stored everything now in the Library of Congress."

Before looking at some of the things I believe are coming in the 70's in the field of safety or loss control, consider briefly the fantastic science and technology of today.

Machines that can multiply 100,000 ten digit numbers and give you the answer in less than a second or one that can be programmed to take the Holy Bible and read it, memorize it, analyze it and categorize it in about 2 seconds (kind of "instant" devotions).

These computers made possible the amazingly complex moon voyages we almost took for granted. Hitting the moon with a rocket launched from earth has been compared to a man standing on a platform revolving counter-clockwise, aiming at a duck a mile away flying clockwise and hitting him with a .22 caliber bullet squarely in the pupil of the left eye. Thirteen years ago, a scientist used this illustration in a science magazine and stated flatly it would never happen. He hadn't envisioned what computers would eventually do.

Of course, we now know, with our penetrating 20/20 hindsight that it not only did happen, but that it has been done so frequently that live T.V. broadcasts of U. S. moonshots compete unsuccessfully for viewer time with programs such as "All In the Family."

In spite of the existence of this level of technology that can put a man on the moon and develop machines that can keep men alive after they have stopped breathing or their hearts no longer beat; we have not yet quite emerged from an era of general safety practice in industry dominated by a preoccupation with injury prevention to such an extent that traumatic injury and accident are synonymous terms. Although this era produced a philosophical recognition and acceptance of the need for occupational hygiene, damage control, products safety, environmental pollution and fire loss control, the actual prevention and control practices used by the safety practitioner were for the most part devoid of these considerations.

I am not denying the fact that the injury oriented safety approach has brought about a significant reduction in occupational deaths and injuries over the years, but it is never the less a fact, in the U. S. at least, that injury rates have shown a rising trend in the past decade. This fact was one of the primary reasons for the enactment of the most comprehensive piece of workplace legislation ever passed by the U. S. Congress - The Williams-Steiger OSHA of 1970.

I believe we all will admit that the magnitude of the human and economic loss problem extends substantially beyond the personal injury loss. How much this is so highlighted by an extensive study of accident ratios completed by a research group headed by F. E. Bird, Jr. In 1969, 1,753,498 accidents reported by 297 cooperating companies were analyzed. Represented were 21 different industrial groups employing 1,750,000 personnel with an exposure of more than 3,000,000,000 man-hours during the period of the analysis.

The study revealed that for every serious or disabling injury (as defined by the ASA, Code Z16.1-1967) reported, 9.8 injuries of a less serious nature and 30.2 property damage accidents were reported. A further study of 4,000 hours of incident recall by trained supervisors indicated 600 "no-injury/no-damage accidents" were occurring in this relationship.

The study clearly shows the futility of directing our major efforts exclusively toward the few relatively rare-event serious or disabling injuries when there are more than 600 less serious occurrences that provide a basis for more scientific control of accident losses.

The first requisite for the 70's then is that the loss control manager must recognize the safety interrelationships of the occupational systems M-E-M-E components. If this is done occupational safety is then defined as "freedom from M-E-M-E interactions that result in accidents," and an accident then becomes "an undesired occurrence that results in personal injury, property damage or degredation of the system's effectiveness."

Incidentally, I suppose most of you who are safety professionals have recognized that we have included four factors or subsystems in our total loss control definition of safety compared to three subsystems "man-machine-media" used in the aerospace definition. The reason for our adding the materials processed or assembled to produce the product as a separate factor is that we believe it contributes its own independent and interrelated exposures to the system to a degree sufficient to require its own distinctive controls or prevention techniques. One exposure contribution, for example, unique to the product or materials processed is that of user product safety.

Another critical loss control objective for the 70's is the need for those of us who profess to be professional loss control managers to develop a more universal capability of making effective application of the products of research and development in other disciplines (i.e., medicine, behavioral sciences, engineering, chemistry -- to name just a few).

There are many concepts or techniques developed by researchers and academicians that are not being used today because they are cloaked in a language unfamiliar or meaningless to the safety practitioner or front line supervisor who is ultimately responsibile for applying these safety techniques, a partial list of the more familiar include:

1. Biomechanics
2. Behavior Reinforcement
3. System Safety-Accident Prediction
4. Computer Technology -----

---- and until recently, I would have had to include critical incident technique. I say that with some degree of modesty because I had the unique pleasure of co-producing with Frank Bird a more practical industrial application of C.I.T. called "incident recall."

This method of study of no injury/loss accidents, which we define as incidents, calls for direct dialogue between the front line supervisor and the employee. The immediate objective is the recalling of any and all incidents a worker has personally seen (or heard others describe as having seen) that could have resulted in personal injury or property damage. As we saw in the ratio just mentioned recall results in the reporting of substantially more accidents before loss than the number of accidents being reported that have resulted in injury or property damage loss and this provides a larger group of accidents for study and analysis on which to base our prevention countermeasures. Another benefit is that incident recall increases substantially the number of injury/damage accidents voluntarily reported outside the recall system.

Incident recall, I am happy to report, is being used by companies such as Lukens Steel Co., Westinghouse Corp., TWA, several departments of the U. S. Federal Government and even in Disneyland in Anaheim, California. This method is more adequately described in an article in the October 1969 Congress issue of the National Safety News - if you would like to know more about it.

A Professional Safety Management System

The third need I see for the 70's is the necessity to totally integrate the function of loss control into the professional management system. Not as an adjunct function of management -- rather as a mainstream function -- so that the planning, leading, organizing and controlling functions of management include loss control as well as cost control, production control, quality control and expense control.

I am convinced that herein lies the key to a successful loss control program. According to Louis A. Allen, a well known management consultant, "management's environment is changing with increasing momentum, originating and incorporating new approaches and methods in an entirely new technology of management." This transition period through which management is presently passing offers the loss control professionals unprecedented opportunities to be the catalysts and bring about more rapidly and completely the inculcation of loss control into the profession of management. So it is vitally necessary that we become managers ourselves and have a basic understanding -- indeed a working knowledge of professional management principles ourselves.

The concept that loss control is a mainstream or basic management function is based on the axiom that all causes of loss can be limited or prevented entirely by a 100% effective application of management planning and control.

In practice, however, we know that the cost of a system to completely eliminate the shortcomings of the existing M-E-M-E system is neither economically feasible nor necessarily desirable.

There are four key steps in the loss control management planning and control system that must be achieved:

1 - Specific work activities required at all levels of management have been clearly identified in terms of critical and specific objectives.

2 - Performance standards for each activity have been established.

3 - Performance evaluation of results or progress relative to standards is established.

4 - Performance correction objectives to eliminate deficiencies are fulfilled.

Step I - Delineating and applying management's safety work in terms of critical performance activities is what keeps the most important domino from falling and starting the accident chain. We did this in our total loss control concept by identifying some 26 critical areas of activity that we would expect to find in a highly successful, modern program. Activities such a 1 - Facility Inspection, 2 - Investigation, 3 - Total Job Analysis, 4 - Product Safety, 5 - Skill Training, 6 - Incident Recall to mention only a few.

Step II - In addition to the identification of these major activity areas of loss control, common to successful programs, we have also classified nationally accepted standards for successful promulgation of each activity at a basic, intermediate and advanced level of development.

For example, to explain what I have just said; accident investigation is a universally accepted loss control activity for a basic safety management program and is therefore a "critical performance activity" of management in our total loss control concept.

As to whether this activity is performed at a basic intermediate or advanced level we apply standards, again universally accepted, in the following manner:

Basic:
1. All injury accidents investigated
2. Properly designed investigation forms utilized
3. Special announcement for major injuries.

Advanced: Would include those standards included in basic, intermediate plus:

1. All accidents must be investigated
2. A qualitative rating system of accident classification is developed and used
3. A formal, remedial management follow-up system is utilized.

For the sake of brevity I have omitted a great deal of explanatory detail, such as what we mean by a qualitative rating system in terms of program steps, schedules and even budgets, but this should give you an idea of what we mean by objective standards for performance of critical activities.

By the simple application of numerical values for the degree of proficiency or level of attainment for each standard, a quantification of effort for computerization or other comparison purposes for each of the 26 areas of activity can be achieved.

These critical performance loss control activities and accompanying standards are expressed in an organized report called a developmental profile of loss control activities.

Once a "profile" has been made of any company, plant or department desiring loss control service, a complete documented record of the exact posture of existing effort can be presented to responsible management with suggested guideposts for improvement based on the program standards mentioned above.

This basic document is then used to determine the program necessary for both immediate and long range risk improvement. The initial "profile" is upgraded as progress is accomplished. This permits management to evaluate performance against standards and then establish critical and supportive objectives to meet specific needs and manage the implementation of them in accordance with good management practice. In addition to being a professional management technique, the developmental profile is a predictive or preactive loss control tool. We'll tempus fugit so let me briefly summarize the potential developments I have mentioned for safety in the 70's and add a few thoughts on which time does not permit elaboration. (I might as well completely expose my ignorance while I have the chance.)

I. First requisite - loss control management must recognize the safety interrelationships of the system's M-E-M-E components.

II. Second objective is need to develop a more universal capability of applying the products of research in other disciplines such as medicine, engineering, etc.

III. Third is the necessity to totally integrate the loss control function into the existing management system.

Those on which time does not permit adequate dissertation and yet that I am compelled to mention are:

A. There will be an expansion of research related to occupational illnesses. Many illnesses, some that are terminal in nature, will be traced back to occupational sources. This effort will be given significant expression by the new OSHA in the U. S. and will have an international impact.

B. There will be a more intense effort to engineer health hazards particularly out of the work environment rather than depending on conservation programs which utilize protective devices, such as ear plugs or respiratory aids.

C. The 70's will be the decade of professionalism for safety, this thrust has already been started with the creation by the ASSE of the Certified Safety Professional Designation. More is needed, and will be forthcoming, as far as college or university level safety curriculum development is concerned. An essential criterion for professional designation of any sort "requires knowledge of an advanced type in a field of science or learning customarily acquired by a prolonged course of specialized intellectual instruction and study in an institution of higher learning." (Taft-Hartly Act - definition of a professional employee not covered by the Act.)

D. New measurement techniques for prediction and control of accidents will be developed. While most safety technicians, myself included, are convinced of the efficiency of safety program modules such as group meetings, poster programs, job instruction,etc., there is often too little evidence of the worth of the investment in terms of money and manpower that management is asked to commit.

One such technique may well be the one mentioned by William A. Tarrants in an article titled "Applying Measurement Concepts to the Appraisal of Safety Performance." The May 1965 issue of the Journal is called Behavior or Activity Sampling.

This technique consists of making a number of observations of employee behavior at random points in time with instantaneous decisions made as to whether the observed behavior is safe or unsafe. Because the data has been obtained on a random selection basis, an inference can be made concerning the safe or unsafe behavior state of the worker population during the entire time from which the sample was chosen.

If new counter measures designed to improve safe behavior are introduced, the change, if any, in the mean proportion of safe or unsafe behavior can be determined.

Well there probably are a number of other important potential developments for the 70's that I have omitted commenting upon - and for this I apologize - if your favorite is among the missing. Let me close with this comment. When the returns are in and counted, we will look back on the 70's and see "mission accomplished" or "broken dreams" depending on the degree of enthusiasm and commitment we bring to the achievement of our individual purposes as well as the wisdom we employ in drafting our objectives.

Let us then plan wisely keeping uppermost in our minds the admonition given to us by that giant of an intellect Albert Einstein who said "concern for man himself and his fate must always form the chief interest of all technical endeavors, never forget this in the midst of your diagrams and equations."

Let us too have men in our discipline, totally committed, not just involved, providing a safe and healthful environment for humanity - (Story of Mrs. Chicken and Mr. Pig to illustrate the difference).

Let us remember too as we attempt to measure our successes and failures in the 70's what a great American, Booker T. Washington had to say about success:

> "Success is to be measured not so much by the position one has reached in life as by the obstacles which he has overcome while trying to succeed."

OSHA ON CAMPUS

Jerry Dempsey
Compliance Officer
Occupational Safety and Health Administration
Louisville, Kentucky

What caused the Congress to act? The frequency of things keeps going up and up and up. As late as last year, we're still having around 14,200 killed in on-the-job accidents and some 2,200,000 being what we call a disabling injury, a "reportable injury," in OSHA language. Let me clear one thing about the relationship between OSHA and the college campus. The law says that the employer shall provide a safe and healthful work place for each and every one of his employees; that's not a direct quote, but that's what it says. Any employer that is engaged in commerce - the court has gone further and defined commerce to be interstate commerce - comes within the purview of the Act. I'll get in a little bit further. Right now there is no doubt in anybody's mind that a private institution, a private college or university, is covered by the Act. The only people that are covered are the employees and not the students. The students are not covered. If it happens to be a graduate assistant who is receiving a stipend, he is covered for the simple reason that it is part of a grant. Now the question comes up concerning state colleges and universities. It hasn't been tested in the courts yet. But the law says that the states and the political subdivisions are exempt from the Act. There are many tests that have to be applied, so if you're relating it to your own campus, there are at least a half dozen tests that have to be applied. One is "Are you on the same merit system as other state employees?", "Are you on the same retirement system?", "Who pays you?", "Where does the money come from?". There are quite a few of these things and if there is any doubt in your mind, the best one to get is your own legal counsel, your own lawyers, at your institution to have them determine it. It has not been tested in the court. However, there is an opinion that public universities are covered in certain cases. In one of the Federal registers is a statement that per se colleges and universities are not covered; it's rather a broad statement that doesn't go into all of the other ramifications.

The Act in essence provides for two things - one, that the Secretary of Labor will develop, promulgate, and enforce a very broad body of standards. Secondly, that the Secretary of Health, Education and Welfare will conduct the research into the cause of accidents, injuries, illnesses, and deaths. In essence, those are the two elements that are in the Act. The third element in the Act is, of course, the Occupational Safety and Health Review Commission. But these are the three cooperating departments, if I may use that term, that are directly involved. I said earlier that the Act covers just about anybody and everybody.

There's been one case that a hearing judge - and they're called hearing judges now instead of examiners - threw out because the compliance did not establish the fact that the employer was engaged in commerce. He didn't establish it, therefore, the judge threw it out. If the pencils are made in Tennessee, Boston, and Kentucky, you've got interstate commerce. The Federal agencies are not covered. The first reaction is "Well why not the Federal?" You're telling us "Do as we say, but not as we do." The President issued a Federal order to all the other departments of the Federal government and told them in essence to get with the program. This is exactly what's happening at this point. The Act does not cover any activities that are covered by other Federal agencies and the most striking one, especially down our way, is the Department of Interior with the Bureau of Mines. We do not have any jurisdiction whatever over metallic or non-metallic mining. When it is out of the ground, it becomes another problem. We also get involved, believe it or not, with the IRS. They have a hand in explosives. The states and the political subdivisions are not covered under this Act at the present time.

...In order to implement the Act, the country is divided into ten regions. Here in this area it's the Boston region, region number one. It covers all of the 50 states and, of course, our off-shore possessions. Within the ten regions there are right now 50 area offices; there are some states that have more than one area office and then there are some areas that have several states. In the Great Plains area you'll find one office covering several states where the industry is rather low. In each area there is an area director. The whole program is decentralized and this is sometimes a veiled blessing. The whole program is decentralized ...the regional administrators have decentralized authorities and responsibilities and the area directors, in turn, have decentralized area and responsibility. What comes out of it? Well, what they've doing in California isn't necessarily what they're doing in Boston, Massachusetts. That is in interpretations. It's amazing how you can put 12 or 14 people down to pick out one part of that Federal legislature and if any of you have seen it - I'm sure you have - it's a real "dilly" to try to read. But you get 12 or 14 interpretations of the simple word and wherever you happen to be in the country the gospel will be according to that area director. Now what's happening? We're working right now--and it's about finished now--on the principle of worst first--who's having the most recordable or disabling injuries, as the case may be, the highest frequency of those. The Secretary did establish five what we call "target" industries. They are as follows: longshoring, meat and meat products all the way through, your roofing and sheet metal men.... We still can't figure out how, on a construction site, how we can divorce the roofing and sheet metal man working up on the structure without going and pulling a construction inspection. But it is divorced; that's the only part of construction that is a target industry. Mobile home construction is another target industry. Wood and wood products - not the manufacture of furniture - but just about everything else that deals with the wood from the time a tree is felled through the logging camps and saw mills...all the way through, except furniture. Also in this target program we have just initiated a target health hazard program...and there are five of the target health hazards: silica, naturally, cotton, asbestos, carbon monoxide, and lead.

What do we do when we're conducting an inspection. The law says that the compliance officer has the prerogative to enter any work place and at any reasonable time and without delay. We interpret anything over 15 minutes as someone trying to delay us, then we start looking much harder, naturally. The first thing we do when we enter a work place - and please, if you have any friends in industry and so forth ..., the first thing we're required to do is present our credentials. You would be surprised at the Madison Avenue hucksters that are on the road. These are documented; the FBI has several of the cases right now where a man walks in with a forged set of credentials, never uses them even, just says "I'm OSHA," makes an inspection and says, "This is going to cost you five hundred bucks right now or a thousand dollars, if you go any further." And the employers are putting the money out..we are required very definitely to identify ourselves and if there's any doubt in the employer'd mind, all he has to do is get on the telephone and verify the presence of the compliance officer. We have what we call an opening briefing where we make sure that he is aware of the law, that he understands it. We advise him that the employees have a right to have a representative accompany us. If the work place is not organized, union-wise, then we are required to privately interview a representative number of employees. The employer has a right to accompany the compliance officer on the inspection. We go around making inspections just like each one of you have done many, many times, I'm sure, with a notebook and clipboard and point out all the deficiencies. The only difference between you gentlemen and us is that we don't have to argue. We don't have to cajole, we don't have to get mean. There are some knuckleheads that try it and they lose in the long run. Having been on the other side of the fence for a little while and having the frustration of when you know darn well that you've got a problem and one of your leaders up the line says, "Look, don't bother me. That's going to cost me five dollars," even though he can save a hundred and fifty, but it's going to cost five..this is the nice part. We just say, "fine" and you'll have a chance, if you want to contest and so forth. There's no argument, no question whatsoever. You just say, "The toilet seats aren't split" - I'm sure you've heard that one - or "You're discriminating against the men because you have a retiring room for the women, but not one for the men" and down the line. Then after the walkaround we have what we call an "exit briefing." We furnish a copy of the standards and God help him trying to read the blasted thing because all we're required to do is mark the index, the sections that we have called, that we have cited.

We then advise the employer of the alleged violations, the apparent violations, whatever you want to call them because they are not final until a certain legal maneuver has taken place. Then we sit down and say, "That's fine, Mr. Employer. How long is it going to take you to abate these conditions, to eliminate these hazards?" Not "Can you do it?" or anything else; "How long is it going to take you?" If it's a matter of dropping the fire extinguishers to five feet or below and he says, "Six months," we say, "That's nice" and it's all right.

Electrical hazards, temporary wiring - flexible cord being used in place of the fixed wiring - where he says, "I can fix that tomorrow." We know darn well that he can't do it tomorrow; we actually go both ways. Then we advise him that there is the possiblity of citation and, when all friendliness leaves the place, also of the possibility of penalty. It's surprising as the word goes around that more and more people - and thank God for this too - more and more employers are coming into compliance. We thought we were getting soft there for a while, but things are looking better. It is working.

We also tell the employer what he can do as far as contesting. If he denies anything the compliance officer has stated, he is to advise the compliance officer then and there. Once the citation is issued, if a citation is issued, the employer then has 15 working days to respond to that citation. The same with a penalty. If he wishes to contest, he has those 15 working days. If within the 15 working days, he does contest even an item of the citation, then the whole case is placed in abatement, held in abeyance. The whole file goes to Washington to the Review Commission. The Review Commission reviews the file and then they either appoint a hearing judge to hear the case or take one of two other actions--either dismiss the case against the Secretary of Labor, or dismiss the case against the employer. If either one of the agrieved doesn't like what the Review Commission has done, whether it's through the hearing judge or through the Commission itself, then they have recource to the Court of Appeals. From there to the United States Supreme Court.

The employees have the same prerogatives. They can contest under certain conditions. They can contest citations; they cannot contest penalties. They can contest the citations where they consider the abatement period as being too long, allowing a hazard to remain for too long a period of time. We also tell the employer that there will be a follow-up inspection and that we expect the conditions to be eliminated, abated...at the conclusion of the abatement date or dates, as the case may be. We also tell them, as a result of the follow-up inspection, that if the abatements are not made, then there are other penalties involved and I'll get into penalties a little later. They can get rather rough, Omaha, Nebraska had 39,000 dollars worth of failure to abate penalties. Needless to say, the employer contested it.

Another item that we cannot do - we cannot give what we call "advance notice." There's no calling and saying, "I'm going to be in your place next week - better be ship-shape or things may happen." There's a penalty on us of 1,000 dollars and six months in prison and naturally you lose your job too, if we give advance notice. There are exceptions to that rule; ...if there's an imminent danger, naturally we're going to inform the employer immediately. Generally speaking, there are no advance notices. The only time we in Kentucky give an advance notice is usually about 4:30 in the afternoon on a Monday or a Tuesday, never on a Friday or a Sunday to a construction site where you have maybe 15 or 20 sub-contractors. If you want to see a donneybrook...when we line up all the sub-contractors, all the employer's reps, all the employees reps, everybody who wants to go, and you look around and you've got 20 or 30 people standing behind you. We do give an advanced notice in that case, but 4:30 in the afternoon for 7:30 the next morning, if he can get it done, more power to him.

What are we finding out in a typical violation? You know them all, believe me, you know them all--first aid and medical attention. A vast majority of places are without the proper first aid supplies and the proper medical attention, whether it be a first aid trained person on the work place or a medical facility in "close proximity," which is now 15 minutes. Emergency protection...fire escapes, fire routes, emergency means of egress, signs, fire extinguishers, fire hoses, pipe systems that are blocked off, sprinkler systems, the whole works. We have found some sprinkler systems where the valves have been turned off and there are some smart guys who took the valves out of the systems.

The big bugaboo - and I'm sure that you have it on your campus - is housekeeping. Invariably--and I'm sure you do too--when we walk into a facility if there's good housekeeping, you know you've got a good inspection on your hands; poor housekeeping and you're going to have a poor inspection. Sanitation...you'd be amazed if you get into some of the nooks and crannies what they have for sanitary facilities. Personal protective equipment...I'm talking about the last resort type of personal protective equipment: the gloves, the muffs, the plugs, the mask, the respirators--operating without the personal protective equipment.

We all know about flammable liquids. It is a bugaboo. In our standards you can't have more than 120 gallons of class 2-A on down, but you'll find a complete disregard of the hazards of flammable liquids. In work places, the worse one of all is gasoline. They say, "Oh, we use it every day and there's no problem. We put it in our cars, we do this - that and the other thing and it doesn't mean a thing." You gentlemen know where that stands under the old system of ratings. Machine guarding, I bet if you go into your shops and your physical plants, if you haven't already cleaned them up, you'll find them in there too - not the guards. You'll find a lack of guards or they're over in the corner. Hand tools, chisel tools, unsafe tools, wired handles, just about anything you want to think of can be a hazard. It's amazing when you go into work places where there is arc welding and you find no protection. The welder himself is usually in pretty good shape. He has got proper clothing on, his shields, he has got the right lenses in and everything else, but his helpers are just sitting there right in front of God and getting the rays.

Temporary wiring is an electrical hazard and using flexible cord in place of fixed wiring. They had a little job to do and they say, "Let's shoot a little bit of flexible wiring up there and next week we'll have the electricians come in and do it right." Three years later it's still up there. You have scaffolding and ladders on your campus. I bet you shudder once in a while when you see ladders in the back out here. Using metal ladders around the electrical conductors--ladders that are broken or poor repair. Another area is your floor and wall openings, guarding holes, if you want to call it that, floor holes, wall openings without standard guarding, stairways without rails, and materials handling equipment. The biggest problem with materials handling equipment is that there is no maintenance done on it. Where we find it in violation it's because of the lack of preventive maintenance. Hoisting gear, the problem there is the wire ropes on your hoists and again the lack of preventive maintenance program. Toxic materials, another area you're all familiar with. The improper use of toxic materials or using them without proper protection, ventilation, or personal protection. The bugaboo is compressed gas cylinders all over the place. It's very difficult to explain why you don't want oxygen and acetylene stored together or any other fuels or getting rid of the cans of axle grease sitting right down with the oxygen cylinders without the caps on.

They're the hazards that we find generally speaking throughout the work places. I'm sure you can relate just about every one of these. I'm sure you've seen them on your campus. I saw them on our campus. I saw them many, many times. We got into the laboratories. For some reason researchers are next to God and nothing can happen to them. We get into maintenance shops and physical plants. In alterations, repairs, modifications of buildings, sometimes these guys will design unsafe factors right into your alterations and the repairs.

What gets us to a work place in the first place? We have a priority. I never say this, but a college campus is very low in priority. I can assure you we have not inspected a single one. There may have been some because of complaints in other areas, but we have never heard of any. Our priorities are fatalities or what we call catastrophes - five or more people hospitalized because of accidental injuries. The second one that can get you in hot water faster I guess than anything else is the complaint. Any bona fide employee has the right to make a complaint against the employer, complaining of an unsafe condition. That is our second priority. In

Kentucky, we've had only about 39 fatalities so far this year so we're doing quite a bit of business on complaints and the fatalities aren't tying us up too much. The third priority is the target industries I mentioned before and along with the target industries, the health hazard industries. The last priority is what we call the general industry and you would fall, generally speaking, within the general industry. The Russian roulette part of the whole thing is the complaint. Thank the Lord it hasn't happened in Kentucky yet, but it's interesting to see what the courts say, whether the University of Kentucky is covered under law or not (when the first complaint comes in).

The whole theme of OSHA is voluntary compliance and what makes the voluntary compliance? We use all of the rhetoric we need to instill in the employer the need for a good, safe, healthful work place. It's like motherhood, it's all good and all that, but we have a sticker behind it and the stick is in the form of penalties. The law says that you must have a provision to apply first-incident penalties. A first-incident penalty of a non-serious nature can range from a hundred dollars to a thousand dollars, but when we get into the seven hundred dollar non-serious penalty, somebody's going to look over our shoulder and say, "Why wasn't it serious, if you're up that high?" That is a discretionary penalty on the part of the compliance officer and the area director. For a serious penalty there is a mandatory penalty of up to one thousand dollars. For a non-serious penalty, the area director can just say, "Fine, just get the thing done." For a willful or a repeated violation the penalty is ten thousand dollars. If a fatality has occurred, the penalty can go up to twenty thousand dollars and criminal action. I'd rather not get into the willful part of it because it's hard to prove intent. If a man is foolish enough to tell the compliance officer, "Like hell I'm going to correct that abatement," then maybe he deserves what he gets. The one penalty for failure to abate is one thousand dollars a day for each day that the employer fails to abate a condition and this can get rather hairy. We have an in-house rule - I guess it isn't an in-house rule because it's in the compliance manual and if you've got two bucks you can buy a compliance manual from the government printing office - that we must make a follow-up inspection within five days of the abatement date. The main reason for that is so that we don't slap anybody too much, but the law says up to one thousand dollars a day for each violation.

The abatement dates--we say on our citations "without delay" so there's no question that he's to move immediately. In fact we tell him in our exit briefing that he must take action immediately; not wait till anything happens, unless he denies the apparent violation. Without delay, but not later than June 29, 1972. On the 13th day of June if it's not abated, he's liable for a thousand dollar penalty. It's not automatic; it can be up to one thousand dollars a day. Believe it or not, the compliance officers do have hearts and they try to use good judgment in working out abatement dates and also penalties. The name of the game is not to see how much money can be made. We have no quota on inspections, or complaints, or amount of money collected, or anything else.

A little bit about state programs. The law states that the states and political sub-divisions have a certain period of time, actually up till 1973, to make a judgment of whether they will take over the Occupational Safety and Health Program in their state or not...I believe, it's by the end of December of 1972...Section 18. All 50 states have indicated the intention of going into an 18-B or an 18-H plan: one is a developmental plan, the other is a full-blown plan. South Carolina came in and they are the first ones with their full-blown plan that had a couple little gimmicks that didn't quite work out. As I understand it they're going back into a development plan again. The Commissioner of Labor - I believe that's what they call him down in South Carolina - had already hired a staff and everything else and he runs out of money as of 1 July so they have to give him a grant for a development plan because he was in good faith. In fact he did a darn good job from what I know about it. The law says that the state must implement, administer, whatever other term you want to use, a program at least equally effective as the Federal program and it must include all of the state employees and all of the political sub-divisions. It's coming. Whether you're a public college or university or not, it's all academic really, because it's coming one way or the other....

One of the bugaboos that's hitting the state plans is the first-incident penalty. They have been bouncing them left and right for that very thing. In Kentucky - they just amended the legislation in special session. They wrote their plan so that there would be no penalty on the first go-around, but if they didn't abate, there would be a penalty of five thousand dollars right off the bat. They said "may be assessed" so it was watered, plain words, just watered out. The plan bounced because of the Congress' action that it must be equally effective and it must have a first-incident citation, first incident penalty possibility. It doesn't say that you must have a first-incident penalty, but you must have a provision for it.

What are the employer's responsibilities? First, he must observe all the standards that are applicable to his business. He doesn't have to observe all standards... if he has what we call vertical standards, if he's in a saw mill or some place like that, he is required to apply those standards to his operation whereas a man in a shirt manufacturing place doesn't have to worry about the saw mill operation, I hope, unless he has something going on the side.

If he's making barrel staves in the back of his lumber mill that has nothing to do with the regular dimension lumber, he must comply, yes. Generally speaking in his own band saws, and bench saws and reciprocating saws, he must comply with the general standards. One of the important things that's missing is in good faith; the employer must keep his employees informed of their protections and their obligations. The law does not say that he must have a safety program, that is, a safety manual if you want to call it that. It doesn't say that he must have safety policies. All it says is that he must keep the workers informed of their protections and obligations and what is a better way than a good, viable, healthy safety program, manuals, rules, SOP, whatever you want to call it. There is no better way. It's there in black and white.

When we get involved in fatalities and in complaints, we look to employer's good faith. This is one of the major factors we consider when we're talking about penalties, especially - his good faith. If he has a set of rules and not one that he pulls out of the drawer and finds out that nothing ever happened - that's questionable too - a good, viable safety program; I don't know of any other way to do it to determine that he is keeping his workers informed. The last thing the employer must do is permit the government inspection of his premises and this is one that hurts the most.

We've been accused of being Hitlers, Russian tactics, interfering with the American competitive way of life and so forth, but all we tell them is to go back to their Congressman; he's the one that did it. We don't tell them that bluntly, but more politely than that. All the Act says about the employees is that they shall comply with all rules, regulations, and standards persuant to the Act. Going back again, the employer, in your case the university or college is your employer, if you have a good set of safety rules, you have informed them, and that person must comply and it has been determined by the courts that that is a condition of employment. So there is some weight in there.

I don't want to get into all the record keeping - we'll get into it during questions and answers time - requirements, who looks at what and so forth. I would like to just leave you with this one thought. The law is very far-reaching. There's just no two ways about it. Right now I'm sure most of you have seen, at least, a copy of what we call the general standards. We have construction standards, maritime standards, general standards and so forth. They are really nothing but a compilation of the concensus standards - the ANSI's, the NFPA's and so forth. We've adopted the National Electric Code in toto. Now there are arguments about that. What does in toto mean? One interpretation is that we have adopted those articles in the National Electric Code that apply to person safety, not building safety, but it's a very fine line to determine when you have person safety versus a facility safety.

The law really is written in such a way that they are relying on voluntary compliance of the employers to correct their hazards so that the conditions will be dissipated, so that there will be no more hazardous conditions in the work place. In our own experience in Kentucky, it is happening. We're up to about 25 per cent of our inspections. We find the employer in voluntary compliance. That's pretty good. When we first started out, it very seldom happened. I don't think we're getting any softer. It's just that we're not finding the hazards that we found before. With that I'd like to open up to any questions that you have.

(NOTE: This presentation was taken from a tape recording.)

INSIDE FIRE

Rexford Wilson
President
Firepro, Incorporated

I'd like to look into fire a little bit. Some of you have come from fire backgrounds, some from security backgrounds, most of you have fire responsibilities. I'd like to take a look today at the make-up of fire, how it works, how it operates, things it can do, and perhaps I'll leave a few specific thoughts that you can do the remainder of this year on your campus to harden it as a fire target. I'll hope to end soon enough so that we can get into answering some specific questions...about problems you have or perhaps get it out of the group. First of all, I'd like to run through some thoughts, pick them apart, plan your questions, jump into anything that you feel is necessary, but I'd like to roll through this first part so that maybe we can have a common purpose here, a common base from which to talk. Together we'll spend the next two days - you will - probing the impact of fire on buildings. We'll do it mostly in this hour of the program. It's fitting and proper to look at fire itself, to examine its mechanisms and how it operates. Fire, a long friend of man, cooker of his food, power of his industry, energy for his trips to the moon, has been a hostile enemy at times, killing him at his home, at his desk, or in his space machine, also destroying his property. For many years man treated fire as a theological problem. The faith, hope, and charity approach was used. Faith that it wouldn't happen at all; hope that if it did happen, it would be small; and charity for those who were injured or wiped out by the flames. But fire is a physical and a chemical thing. It can be completely designed as bridges, and houses, and aircraft can be designed. Thus, fire can be dominated by mankind. To confine fire to its friendly state; much effort has been expended. How effective has the effort been, how are we doing?

First, let us look at the fire protection system. Each of us in this room plays a part in man's attempt to dominate fire, but most of us have a view of one small part of the whole fire protection system. The fire protection system combines research activities, engineering skills, prevention talent, then ignition followed by control activities and critical feedback through investigation, into research again. This is the system of fire protection. What we need to know in research, what we build until it exists is engineering, the action of people is prevention, and then we get the moment of ignition and we've got to control it and we control it in one of three ways. We let it burn out of fuel, we go manually from a remote point and put it out, or we attack it and control it within the structure itself. We will spend our time today during this talk looking at the moment of ignition and what happens in terms of fire size and speed. We will look at the responses available in terms of types, speed, and how each compares. There are obviously many types of fires, from oxygen-enriched space capsules, to pools of flammable liquid, to live electrical equipment, but let us here establish three limitations to our thinking today in this talk. We will discuss fires in ordinary class A combustibles as they burn inside buildings, after they ignite in open flame, ordinary combustibles inside buildings after open flame ignition. As a first step in our study, let us look at the time factor in property.

You are all aware that extinguishers put out thousands of fires annually without ever calling the fire department. You are all aware of the first fire in One New York Plaza which killed three people with a fire on the thirty-third floor, but you mav be unaware of the second fire six weeks later. A major tenant's stockboard belt rubbed against a plastic part that dropped down during construction and began to burn. An employee saw it, leaped from his desk, grabbed an extinguisher, put it out and that was the end of that. On the other hand, some of you have seen cases where witnesses said that the fire was discovered and reported within seconds of ignition, yet flames were coming from all areas of the building by the time the fire department arrived. What was happening here? Was there some unusual factor making for explosive fire spread? Are people at the scene hiding long delays from fire investigators? Why such a rapid fire spread? Why such a lack of time? Let us look at a typical case. This is a corpse of a building; this building died not from the delays of hours, not from poor fire fighting, but from a lack of seconds, from known physical characteristics which provide for normal fire spread through reasonable concentrations of combustibles.

It was Monday evening, just after supper time. The store was open, awaiting an influx of Easter shoppers. The stockboy entered the basement, smelled something, spotted smoke from the storage room, he raced upstairs and found the store manager. The store manager listened to his report and headed quickly for the front door to give the alarm. There he saw a traffic patrolman for the area, told him there was a fire. The patrolman raced to the police call box and sent the alarm to the police desk. The police sargent down at the fire department reported the fire. The paid men drove their fire truck to the fire as the volunteers began their response. Trucks were placed, hoses spread, charged, but by now the basement was heavily involved and unapproachable. Gentlemen, this picture was taken fifteen minutes after the fire department arrived. You can see the line of flame going through the roof, you see the fire coming out the basement window, one coming out the store front window. They have some streams in operation, but you don't put out fires like that. Those lines are there because the T.V. camermen come and the fire department has to do something, so the chief lays some lines. The T.V. camerman takes some pictures and on the news they're treated as heroes while they think they've lost the building, they didn't make it this time. Despite the call for additional help in the effort of good men from twelve engines and five ladders and despite the use of twenty hose lines, the fire built up enough heat to collapse the roof in thirty minutes, knock down the walls in forty. Extinguishment was not completed for about twenty hours. The last engine returned to quarters twenty-four hours after ignition. In evaluating this case, we are vitally interested in the time of the mechanical operation up to the place where water was first discharged on this fire. These minutes are the critical minutes. Let us magnify the front of this time scale and look at where these vital minutes from ignition to the first water discharged on the fire went. Let us call the time from ignition to first agent discarge reflex time. From ignition to the first time the stockboy detected something wrong, one minute and thirty seconds had passed. The stockboy, alert now, checked his instinct only by a glance and reacts with an impulse to tell the manager. He runs to locate the manager, finds him and passes the word. The manager races to the patrolman at the front door; fifty-five additional seconds gone. The patrolman listens, questions, understands and heads for the police call box. Getting to the box, he opens it, waits for the desk sargent's answering, and passes the message. The desk sargent dials the fire department, the man on duty there picks up the phone - sixty-five additional seconds gone. The fire fighters scramble, with trucks leaving quarters in thirty seconds. Light traffic, some corners, one mile of travel. They arrive in front of the building two minutes and thirty seconds additional since they left quarters. Hose flaked out, made-up, and pulled into the building - add one minute and thirty seconds more. Hydrant open, truck set, gates open, hose charged in another minute. You will note that the reflex time in this case, giving everyone the benefit of the doubt and picking times that are on the short side - the ideal side of actual - was nine minutes. Nine minutes from ignition to first water on the fire. Now what had the fire been doing in these nine minutes? We are all familiar with the general time-temperature curve for an unrestricted, unextinguished fire. A - the fire ignites and smolders 'till B when it breaks into open flame. If at point B adequate combustibles are available, the fire will spread and the temperature rise to C where free burning of all ordinary combustibles available occurs. At D the amount of fuel available is diminishing and the fire slowly cools to point E where the smoldering remains burn themselves out. The A to B section may be as brief as twenty milliseconds while flames spread across the surface of a small pool of gasoline or may be as long as fourteen hours where we had a fire burn in rubber dust up the side of a flange on a beam from one end to the other between the time the shop closed and the shop opened. If the smoldering period, however.... The smoldering period is not guaranteed, despite what some detection salesmen will tell you. Open flaming ignitions are common. The critical period here, in terms of the total fire outcome, is the period B to C.

Let us magnify this period and insert data from tests in two Los Angeles schools. One of these tests involved a light wooden crib burning inside the auditorium. The fire found no combustibles from which to spread and thus, provided little temperature increase in the large volume of this room. Another fire was a stack of pallets stored in this stairway during the Los Angeles test. And in the last fire that we look at is one which occurred in this storeroom and you'll see that it has ordinary paper, cardboard, wooden contents; no flammable liquids were used in these fires at all. Take a look at that room. Can you think of a few of those that look like that in your facility? I can, one that looks like that right below my living room. It's an interesting sidelight, gentlemen, of this particular fire test, that two men in the building on the third were almost killed by the irritating smoke, even though they were experienced fire fighters. They were there to record the test data and one of the two gave the order to light the fire. Fortunately, they could be rescued by ladder, but it was a close call. Even though fire fighters and ladders were on the premises and the fire was extinguished five minutes after ignition, he and his compatriot almost lost their lives. They were on the third floor, Gus yelled down the stairway, "O.K., Charlie, light it." Charlie lit it with an open match in this storeroom and we'll see in the temperature graph that follows how it develops. The point is that ordinary combustibles, cardboard, paper, wood, broken chairs, just regular stuff we find in school storerooms and I classify educational storerooms, if you will, higher or lower. (The fire) developed so fast the smoke came up both stairways and all the doors on the third floor had been nailed shut and the hardware had been removed. Gus dropped to his knees with his friend and they started to crawl down the stairway. They were crawling for the back stairway which was belching forth smoke-and Gus passed one of these doors and saw the light coming through the hole where the hardware had come out. You know damn well that you can't put your finger in a hole and pull open a nailed door, right? Gus did. It was motivation. But it was a little heavy-going up there and they had to take them down over ladders and they were out of the hospital within two days. They were there and the fire was extinguished in this room five minutes from ignition and the fire department was on the premises. This is not unusual; this is ordinary combustible materials. Here we see the effects of these three fires superimposed on a time-temperature curve. Note how the low temperature indicative of no fire extension occurred as a result of the small wood crib burning in the large auditorium. You see this wavy line at the bottom - that's the small crib. It's sort of like pouring a teacupful of boiling water in a bucket of ice water;...you've got very hot stuff, but you've got such a big area to dilute that it takes awhile for the temperature to get up there so it's a slow fire. Next we see the curve for the wood, pallet fire and here they were in the stairway and you'll see where we hit five-hundred degrees about five minutes from ignition and ignition again was a single match into a little tiny wad of cotton with an alcohol on it. That was the only thing, in one corner and this was just a normal start in wood. Then the standard time-temperature curve used in fire resistance testing with it's five hundred degrees in two and a half minutes is a reference point. Then notice the storage room fire. It hits a thousand degrees in approximately a minute and five seconds in the room of origin.

We've discussed this half-million dollar store fire and we've looked something at normal fire spread, so let's combine the timing of those two and see what was happening when. A minute and a half after the flaming combustion first took place, the stockboy spotted something wrong. If we used the slowest curve on our graph for a spreading fire, the power-fire curve, the ambient temperature over the fire was about ninety-five degrees fahrenheit at the time the stockboy smelled something wrong. By the time the manager passed the word to the patrolman in the front of the store, it was about one hundred and fifty degrees in the stockroom. As the duty officer picked up the phone to the fire station, two hundred and sixty degrees in the fire area. At the time water was being driven out of exposed combustibles and pre-heating had begun, before the trucks could cross the threshold of the station thirty seconds later, it was three hundred and sixty degrees. As the trucks pulled in front of the building, it was probably eight hundred degrees. Large areas of combustibles in the basement were producing acrid smoke and gases. Flash-overs were beginning to occur in the stockroom. Before water could be discharged down the basement stairs under these operating conditions, the temperature was over thirteen hundred degrees and major flash-over had occurred in the basement. Note especially the fact that had water been applied to this fire within twenty seconds after the arrival of the fire department, i.e. the wheels stopping in front of the building, the fire might have been stopped. You can see a sprinkler line on the bottom. Sprinklers don't operate "till two twenty, but when they do they put water directly on the fire and it somewhat changes the characteristic of the fire and that's why people talk about sprinklers."

This is the pallet fire test that we saw without and with sprinklers - the top shows it with sprinklers, the bottom shows it without sprinklers. You'll note here that the heat cuts off all three floors within about five minutes. Smoke, which is these vertical lines, cuts off both ends of all corridors within six and one half minutes. The temperature reaches about twelve hundred degrees directly over the fire in about seven minutes from ignition. People talk about the response time of the fire department. That's from the alarm 'til the time they get there; this has nothing to do with the reflex time, which is ignition 'til the time the water gets on the fire. The top shows you the sprinkler set-up where the sprinkler goes off at two ten, two twenty and drops the temperature and we lose one end of both quarters and these, of course, were open stairwell schools. This was an attempt to show how open stairwell schools could be defended. This fire is not a freak. You find many of them in the NFPA Large-loss Study, back to the nineteen-sixties; it was nineteen-sixteen when they started. The point is that fire spread in ordinary combustibles is normally very rapid. Perhaps some of you have never run into the word flash-over and if you've ever had the opportunity to see it, you don't have to have it described. This phenomenan occurs within the room of origin. The initial point source ignitions consume fuel around them and the energy created in the form of hot air rises up the wall and the ceiling. If fuel is found on the wall and the ceiling, if fuel is available elsewhere in the room at a high level, it will be heated at two hundred and twelve degrees fahrenheit. At two hundred and twelve degrees fahrenheit water vapor is driven out of the fuel followed by combustible gases that are distilled from the fuel. The logs in your fireplace do not burn; the combustible gases distilled from them burn. This combustible fuel gas will mix with the oxygen at ceiling level and eventually grow in percentage until the lower flammable limit is reached for this mixture. At this point, the fire, local in origin, will spread through this combustible mixture at approximately two to three feet per second. The burning of this massive cloud of combustible gas will raise the temperature within the room of origin, down to floor level, markedly to about seven hundred and fifty to eight hundred degrees. All fuel in this room, including the flooring or the carpeting, will now be contributing gas and feeding this fire. The fire's need for oxygen at this point is voracious. As an illustration of flash-over and the effect that you can control flash-over with the fuel you allow in your building, let us take a look at the tests run by the British on buildings constructed during World War II.

These buildings began to produce a very high rate of fire death. Studies were made to examine the cause of this condition. These buildings were used to house people bombed out of London. In forty-six and forty-seven fire deaths began to occur at a surprising rate. They began to take a look at why these particular buildings produced this particular phenomenon. The upper series of photographs show a building prior to ignition and nineteen minutes later with the roof collasped and the walls starting down and then a gas graph for the bedroom on the floor above. The lower sequence shows an identical fire in the other half of this duplex building; you can see that the first half is already wiped out. Identical contents, identical furniture, identical placement down to the quarter inch, identical everything except that the combustible fiber-board walls and ceilings had been covered with 3/8 inch thick gypsum board. In the upper series you will note that flash-over occurred four minutes after ignition and the oxygen content runs from eighteen to less than three per cent in the following three minutes. Remember that at sixteen per cent, a human being's judgment is rapidly affected. Thus the oxygen-limited fire produces vast quantities of carbon dioxide and later carbon monoxide. This synergistic cocktail of low oxygen content, high CO_2, high CO is lethal in less than twenty seconds. More important, each one of these things alone at that concentration causes immediate disorientation, lack of judgment and poor response of very intelligent individuals at relatively low levels of gas. We had a case in North Carolina where ten children were in a building with a babysitter and she leaped out the window and started yelling "Fire!" on the lawn, the neighbors ran over and told the children, "jump, jump, jump!" - they were on the second floor - and the kids stood inside the building waving. We feel from the way the fire developed, that the mixture they were breathing at that time had them disoriented enough so that they thought that these people who were yelling, "jump, jump, jump, jump, jump!" were simply waving to them. They were not able to correlate. You will note in the lower series flash-over did not occur for twenty-four minutes and oxygen never dropped below sixteen per cent during the twenty-four minute period all the smoke got heavy on the floor above the fire. This enlargement of the gas graph on the fiber-board fire shows why combustible fiber-board is the most dangerous building material used by man today inside buildings; bar none. This material is compressed excelsior, it releases vast quantities of combustible gas with very little energy requirement from the fire. Note here than when flash-over occurred in the living room how dramatically the oxygen content drops, how dramatically the CO_2 content rises. Once we get down to oxygen limitation of less than one per cent the CO content goes up like a sky rocket. Three hundred parts per million is lethal. This is nineteen per cent; one hundred and ninety thousand parts per million. Is there any question that these particular buildings were built to produce a high death rate, higher than any other buildings in Britain at the time?

In 1961 we had a fire resistive hospital burn in Hartford, Connecticut...on the ninth floor. With the fire starting in a trash chute during the noon hour between the basement and the first floor, the heat and smoke built up in the chute and relieved itself at the weakest door, which happened to be on the ninth floor. The fire poured onto the ninth floor and had there been a Class A ceiling, there would have been no loss of life. But the flames coming from the chute met a combustible fiber board tile on the ceiling of this hospital corridor and spread down to the end of the corridor from the chute within two minutes of the time it arrived on the floor and sixteen people were trapped in their rooms and died.

We have not been standing still on the control of interior finish. Progress has been substantial. Our present status is an important factor in our discussions. Briefly, the tunnel test developed by Al Steiner at UL was capable of measuring flame spread across the surface of various interior finishes, but was experimental in 1946. The tunnel exposes a sample ceiling to a heavy, but controlled fire stimulating flame spread through transom. The time and distance of the flame spread is calculated into a flame spread rating. Robert S. Moulton of NFPA staff, annoyed by the fast spreading fires on interior finish in the Coconut Grove fire, the LaSalle Hotel fire, initiated action to develop a classification system for interior finish in conjunction with Al Steiner at UL. In 1948 Bob Moulton called a meeting of fire protection engineers and the new tentative standard on flame spread ratings was drafted. This committee divided the flame spread ratings developed in the tunnel into five categories: Class A was defined as essentially a very low falme spread material; Class B a moderate flame spread; Class C, the wood family; Class D, faster than wood; Class E, extremely fast material. This classification system soon became the standard; Class D and E materials were identified and largely dropped from use. The Steiner tunnel is now operating at a rate of twenty-five hundred samples of building material per year at UL in Chicago. In the fires of the late forties and the tunnel test, one material showed itself to be the most dangerous material used inside buildings. This material was combustible fiber board: several inches of excelsior squeezed together to form a boardlike substance. Combustible fiber board on ceilings where early heat collects leads to very fast flash-over. In the Effingham Hospital fire, the Warenton Nursing Home fire, the Chicago school fire, the church oyster roast fire, the Hartford Hospital fire...this material was the source of the initial high speed fire spread. It's been proved over and over again in the fire record that it will produce killer fires. Meanwhile the acoustical material industry was working hard on an economically acceptable mineral fiber substitute for combustible fiber board. In the mid nineteen-fifties a method of making the mineral fiber on a (Fordnaire) machine was created. This, in effect, dropped the price of mineral fiber and sales picked up. Combustible fiber board began to drop as the percentage of sales.... At the present time less than two per cent of the acoustical material generated in the United States is combustible fiber board, yet the amount sold has grown so large that more combustible fiber board is sold in 1972 than in 1946 and it's almost exclusively sold to dwellings and mobile homes. Gentlemen, you have a number of dwellings on your campuses and if you save a couple of nickels on your acoustical treatment, you can still buy combustible fiber board for those buildings, but I guarantee you that there's enough motion in the fire protection and OSHA programs now that we're going to wipe this material out of existence. Thus, a combination of Bob Moulton's investigations, Al Steiner's research, and industry engineering has given the fire protection engineer an ability to design with remarkable assurance the time to flash-over within the room of origin and to design rooms which will not reach flash-over at all. The use of the Steiner tunnel to develop flame spread ratings is perhaps the greatest advance in spread control in this century.

In Sao Paulo, Brazil, earlier this year, a fire started in a storeroom and spread through a window onto the fourth floor of a store on the first seven floors of a thirty-one story fire resistant building which withstood the fire. This is Sao Paulo, Brazil, a city of seven million people.

In Sao Paulo the weather is so favorable that air conditioning is not usually put in, windows open so that people can get cross ventilation - there's usually a breeze blowing.

This is the Sao Andreas building and the Andreas building was a thirty-one story building supported in the back with vertical supports and in the front an open glass face, one vertical stairway coming out down this opening here, heliport on the roof.

This is another shot of the same area, but you can see some open windows here in the back.

This is looking down the street. Sideways you can see the facade. The wind, gentlemen, this day was eighteen miles an hour blowing across the back of the building, essentially into that stairway. This building...the first seven floors are a department store, the next floors are the office spaces and notice these top four floors, how apparently undamaged they are, there's a reason for it. There were a thousand people in this building at the time the storeroom ignited.

This is looking at it from the other direction. This is the front and we can see that there was some spacing here between the glass panels in front.

There's a picture of the building. At the time this picture was taken, there are seven hundred and fifty people in that building. The first piece of fire apparatus is not on the scene. The fire started in the back, at the base of the stairwell on the fourth floor, spread through a little window, hit the ceiling. The ceiling was combustible fiber board; the building was built in 1961. It spread across the ceiling and out the front window of this building in we believe two minutes. There's a photographic studio down the way with seven cameramen in it. The owner heard a noise, looked out the window, saw this thing in the early stages, sent seven cameramen with fully loaded movie cameras and we had accurate documentation of flame spread in this building. The fourth, fifth, sixth and seventh floors were connected by open stairways in the department store to ease personal traffic. The fifth, sixth, and seventh floors also had combustible fiber board ceilings. We had this wind pushing through, the wind pushed it right through and we soon had four floors fully involved and then it began to come in from radiant heat against that ceiling on the upper floors. This was approximately sixteen minutes after the fire was discovered, probably within twenty-four minutes of ignition. We had thirty-one stories fully involved.

Now I don't know how you read fire pictures. I've been doing it a while and there are a few things that stand out here. Light color is about twelve hundred degrees, deep cherry red down here near the visible range is about nine hundred and twenty-five to nine fifty. We have a floor without ignition here, but all the other floors have ignited all the way up, except for the top four floors of the building which were owned by an American company and had put in Class A ceilings. This is the area where the fire first came through. Here's the fourth, fifth, sixth, and seventh. You can see that it already burned out the fuel, the ceiling in this portion of the building.

In that stairwell, in the back of the building, we had the seven hundred and fifty moved in there. Three hundred of them went up to the heliport on the roof. They got up there and some guy thought there were enough people on the heliport so he slipped the door - it was a sliding door - slid the door shut. There were three hundred people still trying to get up and they just creamed the people who were up near the top as they were pushing up. It seems that in Sao Paulo each tenant can pick the door he wants onto the stairwell. It's a two hour enclosure on the stairwell, but each tenant could pick his own door so a number of them picked hollow core wooden doors. We had an eighteen mile an hour wind going this way; that pressurized the stairway enough to keep all fire out of those stairways with the exception of three floors on the bottom. So we had fire on three floors at the bottom of the stairway, the wind mercifully blowing the fire back in, and this is the roof of a fourteen story building. This is a twenty-three foot gap from this ledge to here and that's a twenty-four foot ladder. You never, but never, put a ladder this way if you're going to bridge a gap; you've got the fly in the wrong direction and everything else and you never get anybody on under those circumstances. This is motivation again. Sao Paulo has a rescue team. That rescue team performed some of the most incredible feats. They've seen T.V. footage and they don't believe they did it, but they got people out. You can see here the stand pipe hose was used to lower from window so people could go down the outside on stand pipe hose. Here's a light wooden ladder that's being put up to try and get people from the floor above.

Here are the three hundred people on the roof. Here's the second helicopter in. The first helicopter came in and the people were in such a riotous state they almost pulled the helicopter out of the air. So the chief of the rescue squad said, "Take me down fifteen feet above the roof" and he jumped down onto the roof and he took charge. He's a big guy and he took charge and he organized those people into groups. He put the biggest guy in charge as the captain, you know our friend from Colorado would have been chosen as one of the people in that situation. How?, sit down. He got them fixed up and you can see that this was taken sometime afterwards because the flame front when the ceilings were burning off...the flame front was about two hundred feet above the building and it scared these people up here quite a bit. One guy was so scared that he thought his chances on a thirty-one story leap were better than waiting so he was one of the sixteen that were killed, but only sixteen people in this thing were killed. Two points - combustible fiber board has done it again and what if the wind had been one hundred and eighty degrees opposite? Yes, I'm making a firm pitch and you've had them. I'm not picking college and university. I could go to the Abigail Adams dormitory at the University of Massachusetts - that was destroyed by combustible fiber board. A one-room fire took off down that hall and got away from the fire department just as they arrived; they watched it fly down that hall as they were on the lawn. It was just that long. Combustible fiber board has taken a toll on the college and university scene. But I'm making a pitch that 1972, the remainder of it, is a year to get rid of the combustible fiber board that you've already got and not to put any more in than you've got. Now you can get rid of it in two ways - you can get a shovel and scrape it off the ceiling, which is one way, or you can get something that has a Class A rating and put over it as the British did. So there are two practical ways to deal with it, but it's the one material that keeps running away from us. There's no way that fire departments can help you if we're dealing with that kind of material. It outdistances us all the time. We can design and I'd like to illustrate now. For example, on April 5 this year, in Worcester, Massachusetts, two boys dragged books, papers...combustible materials in the principal's office in an abandoned school and set fire to this material. Wooden wainscoting two and a half feet up from the floor, wooden bookshelves at each end of the room, desk, furniture, produced flash-over in this room as the first engine stopped in front of the building. Six alarms were required to confine the fire to the upper floors. The next night the same boys dragged paper, wood, combustible material into a vacant apartment 19 at 35 Laurel. Thirty-five Laurel, apartment 19, is this first floor apartment here. Thirty-five Laurel was a three story, six apartment building, with families asleep in the other five apartments. This apartment house had seven inch thick poured concrete slab floors, two-hour cutoffs from a single stairway, one and a half Class B doors with self-closers on the apartment, Class A interior finish throughout, all the apartments and the stairways. The boys lit the material as they had the night before and ran out. Two and a half hours later a night watchman passed through the building and smelled light smoke. He opened the abandoned apartment, found cool, charred material on the floor, called the police who looked through the char, found envelopes addressed to the boys families and, ended the escapade. The point was that there was no flash-over. The combustible material burned itself out in the apartment. The other five families in the apartment house did not even know there had been a fire. The point is, gentlemen, that we can control the time to flash-over by design of the room of origin. We can now use attractive material to build spaces into our buildings that do not produce flash-over at all. This fire attack plan, for this project in question, synthesized information critical for the fire department officer, gathered from the architect, the contractor, the engineers, and the utilities. For the sprinklered sixteen-story high rise in the center, initial attack procedures were developed by the fire officers and added to this plan.

Copies were placed in the guard's office in the project, in the fire alarm headquarters in each station in the city, and smaller copies are carried on each piece of apparatus. The training department uses this fire attack plan for rookie indoctrination in fire officer attack evolutions and it's possible to synthesize your campus with the help of the fire department and so forth into a fire plan for the campus so that the features of your campus will be known and can be utilized in the training programs of the fire department. It would be improper to look at the question of the design of fire and not make a statement, to this assembly, about the American dwelling and I refer to the mobile home, the factory-built home, and the site-built home. The United States dwelling is the killer occupancy. It's no surprise this is true because we use combustible interior finish, including the killer fiber board. We allow open stairwells to carry the fire from one floor to the other and we provide inadequate exit facilities. In other words, we violate three of the basic principles of fire protection in the design of dwellings and then we wonder why we keep burning people up in them. With mobile homes in particular using Class C interior finish and combustible fiber board, small volumes, and inadequate exits it's not a mystery that these one-story buildings are killing three times as many people as their site-built, multi-story contemporaries. Many of our dwellings in the United States are unsafe for human occupancy. I am well aware that some of you have dwellings under your control and you have mobile homes under your control and you've got problems that you've solved in one way or another. The subject of our conference is the protection of campus buildings, but with all buildings we can, through the control of fuel, the control of energy sources that initiate fire, move to fewer ignitions in the first place, longer times to flash-over, even no flash-over at all. A veritable galaxy of attractive materials in Class A interior finish field...for instance, are available for use. Use of Class B and Class C materials can be confined to portions of rooms and still meet the esthetic needs of the owner, the designer, and the decorator. We can, in fire and the life-safety problem, reduce the fire to the point where we have a small problem. Fire need not be a crisis. This talk has attempted to focus on fire and fire growth itself. We have looked at time relationship for fires in ordinary combustible materials burning inside buildings after open flaming ignition. We have seen that time can vary greatly for the amount and arrangement of combustibles, the size of room of origin and the type of interior finish utilized. We have seen that small rooms burn faster than large auditoriums, therefore; closets, storerooms, and various storage cubicles need very restrictive interior finish, shelving, and contents. These spaces may require automatic extinguishing systems. We have seen that interior finish plays a marked role in the spread of flash-over. All ceilings should be Class A interior finish regardless of what the code tells you. All walls should be of a low flame spread. We have seen how, for manual fire fighting, how long it takes for manual fire fighting to get into effect on the first floor of a building. I personally use a factor of a minute per floor in addition to the first floor operating time in figuring fire defense for manual fire department operations for tall buildings. You can well see, using this system, that manual fire fighting is no longer a practical weapon of defense above the fourth floor. Thus, buildings designed four floors and above have got to carry internal fire protection. This protection may come from combustible limitation, through compartmentation, or through extinguishing systems.

To repeat, buildings over four stories must be planned for confinement, fuel limitation, or automatic extinguishment without outside assistance. The fire department is a support, a help. The building and its design must do the job, essentially, without outside help. This conference on campus building problems as well as those that have preceded it force us to remember what George Santayana has told us - "Those who forget the past are doomed to repeat it." In fire protection perhaps we should say, "Those who cannot see the problem must repeat it." I hope this short statement has helped you see the problem and perhaps from a slightly different viewpoint. Yes, research, engineering, prevention, and control are the four parts of our fire protection system. In the area of control after ignition we know that fast fires kill. We know also enough now to be able to build and recondition spaces of our buildings to the place that slow, limited fire growth will be generated. These slow fires with moderate smoke will not be any where near as lethal as the fast burning fires we've seen in the past. The goal for the 1970's should be flame limited to the room of origin and smoke limited to the floor of origin. In 1972 it is clear that man can dominate hostile fire. I predict that mankind will dominate hostile fire on the campus.

(NOTE: This presentation was taken from a tape recording.)

SAFETY AND THE UNIVERSITY SUPERVISOR

Leonard Marcus
Director of Employee Relations
Yale University

Some of you may have your entire safety department sitting right here. Some of you may have a half or a whole secretary back home and some of you maybe have more elaborate staffs. Considering the size of the institutions that we're all from, it is highly unlikely that you will have a big enough staff to do the whole job. Therefore, you have to concentrate your efforts where the action is. Our investigations at Yale are that the action is where you'd expect it to be. Not out there in faculty land, not out there with the secretaries and the clerks; it's in the shops, in the blue collar jobs, just like it is in industry. Indeed, year after year, we run between 80 and 90 per cent of our workman's compensation cases in the service and maintenance jobs. It's the plumber who wrenches his back, the baker who burns his fingers, the first cook who cuts his fingers, or the serving lady in the dining hall who slips on the slippery red tiles. These are where your accidents are and my advice is to concentrate where the accidents are.

It may be much more interesting to investigate the girls' dormitory, it may be much more intellectually stimulating to get into a long, involved discussion with a full professor of history, but that's not where your accidents are. The first-line supervisor is the key to your success. But the first-line supervisor is also a very busy guy. If you want to get his cooperation, you must make sure that he understands what your job is and you've got to make every effort to understand his job and see to it how you can meld the two. This morning I'd like to discuss these four elements of this proposition. I'd like to take a look at how I perceive your job, how I perceive the supervisor's job generally, how I see the supervisor's role in safety and then this all-important element of the supervisor's job - corrective discipline. I understand that you had a representative from the Federal government here yesterday discussing OSHA and the question of employee discipline came up. I hope to suggest to you today ways that you can suggest to the supervisor to be an effective disciplinarian and to make his discipline stick, which is all-important. I'm going to make certain assumptions this morning. I know that these assumptions don't apply to any of the institutions that you work at, but I'll make those assumptions anyhow. I'll assume that the top administration at your university doesn't really know what the hell you're supposed to do. I'll assume that they will never tell you what you're supposed to do and further, I will assume that it's not likely that they will appreciate what you're doing. I realize that that doesn't apply to very many of you here.

Notwithstanding this, you do have a job to do and nobody knows that job better than you. So I think the responsibility of defining your job is yours. You've got to define it. You've got to write out your list of duties and responsibilities. You just can't sit around on your hands or whatever else you sit on and wait for top administration to tell you what the safety function is at your institution. You've got to define the job. You've got to establish the relationships that make the job work. If the job that you decide, or define, is not the one that they want, they will let you know. In the interim, you design it and you go out and make those necessary relationships. Now in order to give me a feel for what kind of a group is here today, I'd like you to show me, by show of hands, how many of you are from public institutions as opposed to private. How many from public? How many from private? It looks like about two thirds are from public institutions and about a third are from private. How many of you are from four-year schools as opposed to two-year schools? It looks like about seven eighths to about one eighth. All of these should add up later to one, by the way. How many of you are from campuses where there are unions and collective bargaining agreements on the campus? How many are on campuses which have no unions? Looks like about half and half. My remarks, I like to think - because modesty is something I don't lack, - will apply to the publics and the privates, the four-year institutions and the two-year institutions, the union and the non-union campuses. I think that the role that we have in safety and my particular role in labor relations are the same no matter where you are and no matter what group of employees you're dealing with. This is something, I think, that university administrations are not yet willing to accept because they really haven't considered it. But if the steamroller of labor unions crosses the country and organizes first in the two-year colleges becuase of the pressures of the elementary and secondary schools and then in the four-year public institutions and then in the great four-year private institutions in the cities and finally gets up into the country, I suspect that three quarters of the campuses, or three quarters of the employees on the campuses in the United States, will be organized, that is, belonging to labor unions of one form or another. This is the time then for management to learn to manage and as safety guys you have to manage. The rest of the university will ultimately catch up with you.

First I' like to discuss what I consider the basic role of the safety manager whether he is called safety supervisor, accident prevention man, safety engineer, or other less flattering names. He has the same kind of a role. His first role is to propose, establish, and enforce safety standards, rules, and regulations. They've got to come from somewhere and you've got to generate these things. You can wait for all the deans to get together and have a meeting and have a committee appointed, but ultimately, somebody has to make the proposal and I believe that's the safety man's responsibility. He has to prepare and/or acquire and distribute safety manuals, training aids, and safety posters. Unfortunately, too many safety men take this single responsibility as their sole responsibility because it is visible. I think it's important, but I think it has to be viewed in perspective. He has investigate accidents and near-accidents, not for the simple purpose of investigating them, but for the purpose of analyzing their causes to see that they're not repeated. He may ultimately want to eliminate them, but I think it's a much more realistic goal to try to reduce them. He has to devise and implement means for recording and analyzing accidents. That, strangely enough, is one of the most critical jobs that I see for the safety manager. As I said at the very opening, it is literally impossible for you to cover the entire campus. You have to statistically determine where the action is and then concentrate your efforts there. It's idiocy, in my judgment, to get all involved in a safety-shoe program if your accidents show only one toe injury in the last twenty years. You've got to look at your own data and determine what kind of protective equipment you need to solve your problems, no matter what the safety equipment salesman says. You have to arrange for, conduct, and report on safety inspections and the better you do that, the better prepared you'll be for the big bad guy from OSHA when he arrives. It's always nice for him to point things you already know about so you can show some evidence of change. The safety man is also responsible for conducting group training and individual counseling sessions and providing guidance for line supervisor-conducted safety training. Safety is a sales program as you guys have been hearing for the last twenty years. You can't sell it all, but you can train other salesmen, namely, the first line supervisors.

You have to represent the university in the discharge of its obligations under the state's workman's compensation act and now under the Federal Occupational Safety and Health Act. That's a responsibility which you've got to garner. Don't let corporate counsel from the university take it out of your hands. Don't let a faculty committee take it out of your hands. You've got to be the guy who speaks to the Workman's Compensation Commission and you have to be the guy who speaks to OSHA. That's an important responsibility because if you allow that to be done by somebody else, you're going to be second guest in the mouse trap day-in and day-out. You must act as the liaison man with whatever employee health services you have, with the Workman's Compensation insurance carrier, and with the medical community, those doctors who are forever creating lost-time accidents out of first aid injuries. You've got to know that medical community. You have to design, select, and approve the purchase of safety devices and equipment. If it's a highly sophisticated device in a nuclear accelerator, sure you can get the advice and the counsel of the chief physicist who runs that accelerator, but the responsibility for the design, the selection, the purchase, and approval has to be yours. You have to safety check plans for new or altered buildings and equipment so that the kinds of catastrophes we saw illustrated here this morning don't occur on your campus. That's got to be done in the planning stage, not after the building is up. You have to evaluate jobs, work operations and procedures from a safety viewpoint, and recommend appropriate action. That doesn't mean that you go barging into the personnel department and say, "I want to rewrite all the job descriptions." It means that you work out an arrangement with the wage and salary administrator and tell him that you'd like to look at the job descriptions from a safety viewpoint; it's another component, another point of view that ought to be reflected in the job descriptions. You have to oversee the storage and removal of waste chemicals and other hazardous substances. That doesn't mean that you have to drive the truck; it means that you've got to make arrangements for having the stuff picked up at the proper location and broadcast this pickup system to the entire university community. You've got to make recommendations with regard to the conduct of hazardous experiments. If you have the power, you ought to cut off hazardous experiments, but you know the power of the higher education system resides with the faculty, but you can't step out of that area and say, "Well, if they've got the power, they've got the responsibility." You've got to somehow encroach on that area and make recommendations for the conduct of hazardous experiments. You've got to represent the university to appropriate government agencies, not only the ones I mentioned before - Workmen's Comp and OSHA. The state legislature may be acting or moving toward an act on health safety, you're the guy who ought to go to the legislature and testify before the committees. And the appropriate professional societies, like the one you're at today. And finally, you have to promote university compliance with all relevant Federal, state, and local laws, codes, and regulations pertaining to employee safety. I regard that as your principal responsibilities. That's the job that I think the safety function has to fulfill. How you do it is, of course, up to you.

What about the supervisor? He's got a responsibility too. And if my experience in this area tells me anything, it is that there is a complete lack of appreciation, frankly, on the part of the safety man and the enormous burden that the first line supervisor has to carry. Too many safety people think that the only thing the supervisor does is keep his work force safe. It just isn't so. The profit and loss statement doesn't make it so. Sure, it's an important part of his job, but it's not the only part. The better you understand all the other things the supervisor does, the better you'll be able to get him to do the things in the safety area. I'm going to read to you a list of what I consider the typical duties and responsibilities of any supervisor, whether he's in physical plant, custodial services, dining halls, no matter where he works. If he supervises people these are the things he must do. This job description, obviously is slanted in the direction of the hourly employee, the blue collar worker who causes 80 to 90 per cent of our reportable accidents. First of all the first line supervisor estimates the time, cost, manpower, materials, supplies and equipment required to perform a work assignment. That's so bloody obvious that most of us seem to forget it. That's his job. His boss says, "Do this." He's got to determine how many people he's going to need, what kinds of skills he's going to need, how long it's going to take him and what the job is going to cost. Now this is an enormous burden and although safety weaves its way into it, that's his principal responsibility - getting a job done. Turning an idea into a work assignment. He also determines the means and methods to be used in accomplishing work assignments. He secures and distributes to employees appropriate materials, supplies, and equipment. Here is an area where he does have a specific safety responsibility. We'll get back to that when we finish roman numeral two.

He has to direct the work of, assign tasks to, and instruct employees and inspect progress and completion of work assignments given to employees. You just can't give them a job, you've got to go out and see how well the job was done. At its completion and at various stages of its progress. He has to evaluate and rate employees with respect to attendance, punctuality, performance, and work attitude for the purpose of determining continued employability, developmental needs, that is, what more do they need, and their potential for promotion. That's another big time consumer for the supervisor. He has to requisition and select for employment current employees or outside candidates referred by the recruiting or employment function. He has to control attendance and punctuality of employees, actually control it, not just keep records of it. He has to administer corrective discipline. That is, oral warnings, written reprimands, suspensions, and discharges to employees for just cause, whatever that means. He has to counsel and motivate employees to improve the quality and quantity of the product produced or the service rendered. He has to receive, investigate and answer grievances, whether in a non-union situation or a union situation. He has to interpret and administer provisions for collective bargaining agreement and other policies and procedures.

The first line supervisor has to review time-work documents, time card - and approve payment for regular pay, overtime pay, premium pay, pay for time not worked, in accordance with the collective bargaining agreement and company policy or university policy. He has to receive and distribute pay checks and initiate corrective action where necessary. If the pay check was wrong, the employer looks to the supervisor to correct it and the supervisor has to spend some of his time doing just that. He has to initiate individual and group employee action notices to effect changes in the status of employees under his jurisdiction. When an employee goes on vacation, the supervisor's got to make out a piece of paper. When an employee takes a leave of absence to recuperate from a Workman's Compensation injury, the supervisor's got to make out a piece of paper. When the employee comes back, he's got to make out a piece of paper.

These are time consumers. He has to plan and make out work schedules, vacation schedules and holiday schedules. He has to arrange for, receive, distribute work uniforms, safety equipment and foul weather gear. He has to investigate accidents, prepare injury and accidents reports, health service appointments and reports in accordance with appropriate policy and procedure. He has to assume the responsibility for the maintenance of, and employee instruction in, proper on-the-job safety, health, housekeeping quality control. He has to train and instruct all the employees under his jurisdiction or see to it that somebody else trains and instructs them. Finally, as a catch-all, he performs all other customary and discretionary supervisory duties. That's a hell of a job. The more you appreciate how extensive that job is, the better you will understand why the supervisor sometimes turns you off when you come charging into his area with a list of violations a mile long. He has other things to do. What you have to do is arrange your timing in such a way that he can be receptive to when you show up. If you know this week all the supervisors are preparing vacation schedules for the summer, this is not the time to come visit the supervisor. Be sensitive to his needs. He wants to help and he can be convinced that the safety part of his job is important, but you've got to do it appropriately. There are certain of these duties that I read off which I think are more susceptible to a safety analysis than others. Clearly, the determination of the means and methods of production and the selection of materials, supplies, and equipment are places where you can give the supervisor a great deal of help. You can sit down with your supervisors or in your training programs with supervisors...concentrate not on the old stuff - showing them a film about lifting, or how to hold a hammer, how to strike a nail, or how to cut carrots. You can concentrate on this thing - the means and methods of production and the selection of equipment. Make it meaningful, relate it to what the supervisor has to do on a daily basis. I'm going to skip over corrective discipline because I want to take it up separately at the end of our discussion.

The supervisor has a very clear responsibility, as I've already mentioned, in investigating accidents, but, for Pete's sake, don't give the supervisor a blank sheet of paper and say, "Investigate the accident and write me a report." Supervisors hate to write reports almost as much as you do. Give them a form. If there are questions that you want answered in the standard investigation of an accident, ask those questions on the form. Wherever you can make it multiple-choice, make it multiple-choice. If you want your reports to come back in a meaningful way, design them in a meaningful way. Don't ask the supervisor to give you a report on a blank sheet of paper. He won't know where to begin, he'll spend a lot of time on it and put a lot of words on the page, but when you get the report, it's not going to tell you what you want to know. The supervisor has to, of course, assume responsibility for maintenance of employee instruction in on-the-job safety. How many of you have situations where once a week the supervisor conducts a five minute safety meeting? Anybody have one of those? That was one of the pet techniques used in industry. After the first two or three weeks it was a totally worthless exercise unless the supervisor was motivated by subject matter supplied by the safety segment. So if you want the supervisor to meet periodically with his people and discuss with his group various safety subjects, give him some help. Give him a list of subjects. Suggest some techniques like you pick on the guy who's always having accidents and tell him to talk about safety. Make those kinds of imaginative suggestions. Help the supervisor, counsel him in discharging this responsibility of getting his employees safety conscious. Well, these are the specialty areas where the supervisors get involved with safety directors and your responsibility is to make that a more meaningful experience for him. Your responsibility is to help him do what you want him to do.

Finally, I'd like to talk about the all-important problem of corrective discipline. Clearly, there are many employees who can be motivated by the carrot. The employee for whom positive motivation is sufficient, the employee whom you sit down and counsel and you say, "Look, you've had three lost-time accidents in the last year. Let's go back and look at your record, what did you do wrong," and in some cases, you're going to get that employee to correct. I think in all cases you ought to advise the supervisor to counsel the employees. However, there are some employees who just don't respond to the carrot. Perhaps if they were motivated by professional psychologists who make their living studying motivation, they could be moved, but most of our supervisors, as most of us, are not professional psychologists. There's got to be an alternative method for dealing with the employee who does not respond to positive motivation and the opposite of the carrot, if this analogy, is to stick. The stick is corrective discipline.

I'd like to discuss corrective discipline and, of course, I'm going to emphasize rules with respect to safety violation, but the rules of corrective discipline apply to any situation where the employee has failed to respond to positive motivation; he has failed to respond to the carrot. For some of your supervisors, and indeed for some of you, it may come as a shock that you may discipline an employee who fails to wear safety equipment, who constantly and regularly performs in an unsafe manner, who fails to report accidents immediately, who fakes a Workman's Compensation injury, to name just a few. It's perfectly legitimate in union and non-union situations to discipline employees for any of those offenses. The big question in discipline is how you do it. If you want it to be effective, you've got to follow the rules of corrective discipline and these are not rules that I dreamed up last night at the clambake, although I did cut myself while struggling with the lobster. Unfortunately, it's healed up this morning. The rules of corrective discipline have developed in industry over the years. They go back to the pre-Wagner Act days, before the labor unions in this country got their shot in the arm for growth. The rules of corrective discipline have been developing within industry since the beginning of the Industrial Revolution. They may not satisfy the psychologist in you, but what's most important is that they will satisfy the labor arbitrator who ultimately has to make a decision as to whether or not the discipline is proper.

First and foremost, the purpose of corrective discipline. It's to rehabilitate and deter. To rehabilitate the offending employee so that he doesn't offend again and to deter him and other employees who see him being disciplined from committing the offense. In short, the purpose of corrective discipline is to avoid discharging employees. That's its real purpose. To do everything short of discharge, to discourage the employee from committing the offense which will lead to his discharge, that's its real purpose. Management's authority to discipline, if you're in a non-union situation, which I believe about half of you are, your right to discipline employees is inherent. It goes back to Genesis; the first employer had a right to discipline the first employee. That's one of the things that separates the employer from the employee. It's as inherent as the right of a parent to discipline his child. If you're in a union situation, that right is usually spelled out in the collective bargaining agreement. It's usually spelled in either one or both of the following places: In the typical collective bargaining agreement there's a clause headed "Discipline and Discharge" and it usually reads something like this - "The University retains the right to discipline and discharge for just cause." That same language may appear in another part of the contract called the "Management Rights" clause where management retains a lot of rights, amongst which is the right to discipline and discharge for just cause. But enough if the contract is absolutely silent on the question of discipline, management still has the right to do it because the collective bargaining agreement only limits management to the extent that the written word in the agreement limits management. If the agreement is silent on any power, management still has that power. It's a very important concept; if the agreement is silent on any particular power, management still has that power. Management has retained everything except that which is given up in the collective bargaining agreement. So in a union situation the agreement may specifically say that management has retained that right or it may be silent and, in either event, management has the right to discipline. Management can only discipline, however, where it has just cuase. Just cause is just not susceptible to a simple definition. Just cause means a good reason, that's what just cause means. Just cause means that to the average, reasonable guy, if he came in off the streets and saw what the employee was doing, he would say, "that guy should be disciplined." That's what just cause means. It means the kind of thing that most reasonable men would agree is a disciplinable offense. It also means that there's a certain balance between the punishment and the crime, that the approach to discipline is reasonable, that the employee should have known that what he was doing was wrong. It's kind of like the criminal law. If the criminal law of this state, or any state you come from, didn't say that murder was a crime, most of us would feel that murder is a punishable offense. We need it for the safety of society. Well just cause is just like that. It's those behavior patterns, those acts which have to be controlled for the protection of the individual who performs them and the victim of his acts. That's what just cause really amounts to.

Let's spend a moment on crime and punishment. Crime and punishment are the terms we use out there, in the criminal law, in the outside, non employer-employee relationship. Crime and punishment--if you commit armed robbery, that's the crime. You get a sentence of twenty years, that's the punishment. In the employer-employee relationship, however, we talk about offense and penalty, which means crime and punishment. We've got to get clear in our minds, however, what is the offense and what is the penalty. Often, supervisors confuse offense and penalty. For instance, the employee who commits a wrong gets a written reprimand. The written reprimand is the penalty; the reason he got it was the offense. With respect to offenses, they really fall into four major categories of wrongs because before you reach the idea of which category to put the offense in, you have to ask the simple question - did the employee commit a wrong? The big four categories of offenses are excessive absenteeism, excessive lateness, poor performance, and improper attitude.

There are literally thousands of offenses, but each of them, in my judgment, can probably fit into one of those nice neat packages of excessive absenteeism, excessive lateness, poor performance, and improper attitude. The safety offenses fall into the last two categories - poor performance and improper attitudes. The employee who steps up to the grinder without safety glasses, without a shield... that's part of his performance. Performing his job requires that his job be performed properly and properly means safely. If there's a guard on the machine, he ought to use it. The painter who goes into one of your academic buildings and spills all kinds of "goo" on the floor and doesn't clean it up is poorly performing his job because his job is not merely to paint, but to paint safely. So all of these offenses, which I'm sure you can add up in your mind to many, many hundreds fall into the poor performance category. Examples of the poor attitude category is the employee who when asked to wear his safety gloves, which are sticking out of his back pocket, while he's loading lumber on the truck, says, "You can take those safety gloves and..." - that's poor attitude. The employee who refuses to wear his hard hat because it doesn't make him look attractive to the female students on campus - that's poor attitude. Insubordination, failure to follow instruction - those are the things of which improper attitude are made. So those are your offense categories: absenteeism, lateness, performance, and attitude. There are in infinite variety of particular offenses that could fit into those.

With respect to penalties, however, the list is finite. It's not an endless list. In my judgment, there are only four penalties: oral warnings, written reprimands, suspensions, and discharges. The trick in selecting the appropriate penalties is to let the punishment fit the crime. You don't discharge an employee who has never had a safety offense before because he simply refuses to wear a hardhat when asked for the first time. You don't discharge an employee who's been with you for three weeks, has an accident, and fails to report it for a week. His first offense. You've got to get the balance; you've got to let the punishment fit the crime.

Oral warnings are appropriate for minor first offenses. You don't always have to give an oral warning first. If the cook in one of your dining halls is having target practice against the refrigerator door with a meat cleaver, it's not necessary to give him an oral warning before you take a more severe disciplinary action. Particularly if he decapitates another employee or a supervisor. I would suggest that you suggest to the supervisors that you will be dealing with, that they use oral warnings sparingly. Supervisors like to give oral warnings because they don't have to write anything, they don't do any investigating so they tend to overuse the oral warning. The oral warning is of limited value; it's difficult to prove that it was ever given. It's difficult to prove that what the supervisor said, in giving the oral warning, he did indeed say. The employee always said, "He never said that," that he never spoke to him, don't even know who he is. So oral warnings should be used very cautiously.

The written reprimand is perhaps the most effective of the disciplinary actions. It should come either after an employee has received an oral warning or for a first offense which requires more than just an oral warning. We'll get around to discussing the details of the written reprimand in a little while. For the employee who repeats his offense, who has not responded to the written reprimand, then the next step is a suspension. I like a three-day suspension, Tuesday, Wednesday, and Thursday. When you give an employee a suspension on a Monday, Tuesday, and Wednesday, he goes home and he tells his wife he got a special vacation. You know, Saturday and Sunday and the first three days of the week. Remember, the purpose of suspension is to make it difficult for the employee, to embarrass him and to make him feel uncomfortable so he won't take another one. Have him come in on Monday and then go home on Tuesday and Wednesday. Maybe he's got to come back for his paycheck on Thursday, but not work, and go back home on Thursday and then come back to work on Friday. Really foul up his week, really make it uncomfortable for him, so he'll know it's punishment, because that's what it is. Now clearly, if the employee is not scheduled from Monday to Friday, give him his three-day suspension in the middle of his work week. Make it tough, don't make it easy. I don't like long suspensions. I don't think that if you give an employee a ten-day suspension or a twenty-day suspension or a thirty-day suspension, that it's really going to be that more effective than a three-day suspension. Three-days is enough so that when an employee gets his paycheck for that week, it's missing three fifths of his paycheck. That's a pretty heavy fine. Besides the long suspensions just cause all kinds of production problems. Most of your operations are understaffed anyhow. If you put a guy out for thirty-days, you're just hurting the supervisor's ability to get the work done. A three-day suspension is ideal. Clearly, there are exceptions to that, but generally speaking, it's an ideal suspension.

Now for the employee who fails to respond to the suspension, the only thing left is industrial capital punishment-discharge. Because after a written reprimand and suspension or maybe two written reprimands and two suspensions, if the employee is not going to correct, then he must be gotten rid of. The employee, particularly in this area, who constitutes a safety hazard to himself and to his fellow workers and to our customers, the students and faculty, if he hasn't responded to your corrective discipline and that's the key word, corrective, then there's no other alternative but to discharge him. It sounds hard and cruel, but the safety of the other people is just as important and he should be discharged. Now you don't have to follow this rigidly. You don't have to give an oral warning, written reprimand, suspension, then a discharge. Depending on who the employee is you can vary it. You may discriminate as long as you don't discriminate on the basis of race, color, religion, sex, age, and national origin. You can discriminate against employees who have lousy attendance records as opposed to those who have good attendance records. You can discriminate against the poor performer as opposed to the good performer. You can discriminate against the long-service employee as opposed to the new employee. You ought to take more time before you discharge somebody who'd been with the university for thirty years as opposed to somebody who has been at the university for only a year. That's perfectly legitimate discrimination and it's just the kind of discrimination that you get paid to perform. We're always making judgments about employees; that's our job. So for a long-service employee who's gotten a written reprimand, maybe you'll give him a second written reprimand before you give him a suspension. Maybe if he's gotten a suspension, you'll give him another suspension before you discharge him, but ultimately if he doesn't correct, no matter how long he's been at the university, no matter what kind of a performer he is, no matter how loyal he may be in other areas, if he constitutes a major, non-correctible safety hazard, then he must be discharged.

The disciplinary action - and this applies to the written reprimand, the suspension, or the discharge - in order to stand up in court, so to speak in arbitration, and in order to get the message across to the employee, ought to contain the following elements. First off, it ought to identify the penalty and the offense. In the very first paragraph the document ought to say, "I am giving you this written reprimand as a disciplinary action for your failure to report an accident within the twelve hours." It ought to say that at the very beginning. I have read disciplinary letters that sound like letters of commendation. The employee doesn't really know what he's getting. From the very first paragraph, you must identify what is the penalty, what is the offense, and indicate that this is a disciplinary action, not just a note or a letter of commendation or an odd piece of communications. That this very action should give the cold, hard facts, not conclusions. It ought to mention when the offense occurred, the day, the date, and the time. At ten o'clock, on Monday morning, on June 25, 1972 something happened. It ought to say that. It ought to say where the offense took place-the place, the building, the floor, the room, the section. Those are facts - where did it take place. Then it ought to say what happened. What the supervisor, or whoever is writing the disciplinary action, saw, smelled, tasted, heard, or felt. Those are facts and not conclusions. Classic examples...Employees are never drunk; they are always 'unfit for work.' You never write a disciplinary action that says, "You were drunk." You say, "As I approached you, your eyes were bloodshot, your breath smelled of alcohol, your speech was slurred, and you wobbled when you walked." Now, for crying out loud, that means drunk, but you're not arriving at that conclusion. To say he was drunk is a conclusion and you get involved in all kinds of problems. How do you know he was drunk? Are you a chemist, are you a doctor, did you have him blow into a baloon, did you call the police? You don't want all that nonsense, but you can say what you saw, smelled, tasted, felt, and heard. Don't draw conclusions. Don't say to the employee, as a conclusion, handled a hammer unsafely or handled a machine unsafely. Say what he did. "You made an adjustment on the blade without shutting the power off. You operated the machine without the guard in place." Those are the facts, the cold, hard facts, now the conclusions.

Let the conclusions be obvious to anyone who reads them, but concentrate on the facts. Then the written disciplinary ought to state the wrong, the specific section of the agreement - the collective bargaining agreement, if you have one - or a policy or procedure, a specific rule breached. How many of you have safety rules on your campuses? My goodness, O.K. It's good to have those rules because that's advance notice to the employee; he knew or should have known that what he did was wrong, but that's something that ought to be cited. Now, if you don't have rules, that doesn't mean that you can't discipline. You don't have written rules, you still can discipline. An employee who works on a machine which has a guard and who swings the guard away to work on the machine obviously is doing a wrong even though there's no rule that says, "All machines will only be operated when the guard is in place." If he swings the guard away, it's obvious that he knew the guard should have been swung the other way. I would advise written rules, but even if you don't have them, you may discipline for anything which is expressed or implied in the work situation. Then discuss in the written disciplinary action the results of the wrong.

The actual or potential results of the wrong - what was the cost to the university, fellow workers and others? Actual or potential cost--you can say in the disciplinary action that when you operated that table saw without a guard you could have lost several fingers. This could have cost the university several thousands of dollars. You can say that. You could have also rusted the blade. Talk about the burden on you, the supervisor, and on other employees. Tell the cook what's wrong with throwing the meat cleaver against the door; it may not be obvious to him. State in the disciplinary action that you could have endangered the lives other employees and also dulled the meat cleaver. Talk about the hazards to other workers. Don't be afraid to mention that. Then the written disciplinary action should cite any prior disciplinary actions for the same or similar offense. If this is a written reprimand, and you've given the fellow an oral warning, say so. On such and such a date, you were given an oral warning for a similar offense. It it's a suspension, cite the prior written reprimand or reprimands and any oral warnings.

Each discipline should cite all the prior disciplines, not going to 1936, however. I would suggest that you go back no further than twelve to eighteen months in citing prior disciplines. After all, everyone's entitled to having the slate wiped clean once in a while. Then, and this is where a lot of people fail in writing disciplinary actions, the final paragraph should say, "I am by this written disciplinary action warning you not to commit this offense again and I'm giving you an opportunity in the future to correct yourself and should you fail, you'll be subject to further and more severe disciplinary action." There has got to be a warning and an opportunity to correct, that kind of language in the closing of the disciplinary action. That warning ought to be indefinite, by the way, and flexible. It oughtn't to say, in a written reprimand, that if you commit another offense, you will be suspended. You oughtn't to say when you write a suspension letter that if you commit another offense, you will be discharged. You deliberately ought to be indefinite and flexible. You ought to say, "Should you fail to correct yourself, you will be subject to further and more severe disciplinary action." You have your options open. If you predict, in a suspension, that you're going to discharge an employee, when he commits that second offense, you don't really feel that it's worth a discharge - it's probably worth another suspension - you've limited your options, if you've predicted in your prior discipline what you're going to do. So be open and flexible. That's the sum and substance of the content of a disciplinary action that's in writing. Certainly it ought to be signed and dated when it's issued. You may type it up today and when you go to give it to the employee and he's absent or he's on vacation. Just take a pen and strike out the date and wait 'til he comes back and the date you give it to him, put the new date on it...Sign it and date it. Then you distribute it.

Because a written disciplinary action which when you read to your wife at home, she's very impressed with, doesn't do any good unless it gets to somebody. The original ought to go to the employee because he's the guy who's being disciplined. In many universities the employee doesn't get disciplined; his manila folder gets disciplined. Some supervisor sends a letter to personnel and they put it in a folder. Somehow the folder is supposed to communicate to the employee that he's been disciplined. The original must go to the employee. If you work for a university which has a union and the employee is represented by the union, send a copy to the union. Either give a copy to the shop steward when the discipline is issued or mail it to the union's business secretary and let the letter show - carbon copies, union business agent. Send copies to various people in management. Certainly to the employee's department head. The supervisor's boss - he ought to know who's being disciplined in his department. Send a copy to personnel so they can put a copy in the employee's manila folder so that when the supervisor goes back to see about prior disciplines, he can look at the record and see what's in it. If you have a labor relations section, send it to them so they can help you if the way the discipline was written was not proper in the future. So the original to the employee, copies to the union, copies to various sections of management.

Who's responsible for the administration of corrective discipline? How does it work? Who meets with whom, who gets what, when does it happen, where does it happen? The immediate supervisor is the only guy who can properly administer corrective discipline. The safety manager should not discipline employees for safety offenses. That's the supervisor's job. You can help him in writing the disciplinary action. You may be present during the disciplinary meeting, but he's got to sign it and he's got to issue it. It should not be done by his boss or the department head and it should not be done by the personnel supervisor. This is a responsibility the supervisor must carry. If he doesn't carry it, he has no credibility. He's emasculated. The employee recognizes him as being powerless. The employee only respects those people who have power - the department head, the personnel guy, you. It's never going to work. The supervisor has to have this visible power and exercise it so that he and only he can issue the disciplinary action.

When do you have to issue it? Within a reasonable time. You don't have to shoot from the hip. The employee who operates the table saw without the guard doesn't have to be disciplined that day. The supervisor doesn't have to drop everything else. Write up the discipline, and get it out before the employee punches out that day. He can take his time, he can take two or three days. Too many supervisors shoot from the hip or too many don't discipline at all because they say, "That happened yesterday. I can't discipline him." A supervisor has a reasonable amount of time in which to take disciplinary action. It does not have to occur on the spot.

Where should the discipline take place? In private. In the supervisor's office, and if he has no office, in some quite corner of the shop. If the shop is noisy, go to the library; there's always some quiet there. The supervisor, the employee, the shop steward if it's a union place. It's got to be in private. You can't discipline an employee out there in the middle of the shop floor with everybody else looking on. Because the employee's ego is hanging out and he will be much more concerned with the looks of people around him than listening to what the supervisor is saying. It's got to be in private, even if you have to get the employee to stay after hours and pay him for the half hour. Issue the disciplinary action in private, where you and the employee can have a communication.

Now what is it, this disciplinary action? It's that letter we just talked about, whether it's a written reprimand, a suspension, or a discharge. That's the vehicle for the whole discussion.

How is it done? In a face-to-face meeting. Never, never mail a disciplinary action. If you mail the disciplinary action, first of all you lose the face-to-face confrontation. Second of all, you don't give the employee a chance to respond. Maybe all your facts are wrong. Third of all he will never have received it - "Oh, I never got that letter. Never saw it." Even if you send it registered mail - "Somebody else signed for it. I never saw the darned thing." How it should work is that you call the employee into the office, you call in his steward and you sit down and you give the employee a copy of the letter, the original, and you give the steward his copy and you read your copy, you read it. As silly as that may seem since the employee can read and he has a copy, you read it, slowly and deliberately. You can tell him, "As I go through this, if there's anything you object to, let me know." If when you say, "At ten o'clock, on Monday morning, June 25, I saw you doing thus and so." and he says, "No, it was eleven thirty," change it immediately from ten o'clock to eleven thirty. If there are any facts which he contests and which you don't mind his contesting, change it. If he disagrees with the facts, but you know the facts are right, don't change it. Read the letter line by line, slowly and deliberately. Give him an opportunity to challenge it. An opportunity to challenge the discipline does not mean he can do away with it. If it's your word against his, you take your word. Now some employees get all riled up about this experience. They'll take their copy and heave it at the supervisor and go storming out of the office. That's another disciplinable offense - insubordination. The supervisor has a right to require the employee to sit down in his office and take a disciplinary action. He has a right to do that. If the employee doesn't like it, he can grieve after the fact. Many supervisors are afraid of a confrontation because they're afraid the employee will do just that - he'll toss the letter in their face and walk out.

...The supervisor and the employee and the steward come into the office. The supervisor sits here and the employee and the steward sit there. He's his lawyer. Don't expect the shop steward to take management's part. He cannot; it's politically impossible. He has got to represent his client, whether his client is right or wrong. Don't ask the shop steward to help discipline the employee. He has to get elected to office. He's not going to get votes from people whom he helped push down. And just because the shop steward represents the employee, don't have any hard feelings toward the shop steward. That' his job, he's the employee's lawyer. He may tell you privately you did the right thing, but he can't tell you that publicly and don't expect him to. All you need to do with the union is to give them notice. That's what due process means - notice and an opportunity to be heard. And you give them notice when you call the employee and the steward into the office and you give the employee a copy and the union a copy. That's all you need to do. Now, if the steward says, "I'm not coming." as long as you've given him the opportunity to come, you've satisfied your obligation. All the union can do is to grieve, if he so chooses. It can't stop the issuing of the disciplinary action. It can't say to the employee, "Let's get up and not listen to this junk. Let's leave." It can't do that. It can grieve after the fact. The only two questions it can raise in its grievance, no matter how they raise them, are two in number: was there just cause and was the penalty too severe. No matter what the union's grievance says, that's what it means. Whether they're challenging that there was not just cause or that the penalty was too severe. O.K. then, that's corrective discipline. It applies to safety as well as it applies everywhere.

...We've talked then about what the safety mission is with respect to the service and maintenance employees at least, probably to everybody. We've talked about generally what the supervisor's job is. We've talked about what his special responsibilities are in safety. Then we talked about that all important responsibility, corrective discipline. I hope, with this approach, you've gotten a fuller picture of how that other guy has to operate and how you can help.

(NOTE: This presentation was taken from a tape recording.)

FACULTY LIABILITY

Edward J. Regan
Attorney
Tillinghast, Collins and Graham

The issue of the potential liability of professors, associate professors, instructors and others in similar positions arising out of accidents related to their academic duties and resulting in personal injuries or property damage is a subject of increasing importance to the academic community. The more sophisticated and complicated equipment necessary in present day courses of instruction with the attendant increased requirements of care and supervision coupled with the often increased class sizes and other complications of modern education require an awareness by all those associated with education of the potential liability of not only the institutions by which they may be employed but the liabilities to which they may be individually exposed in connection with their duties.

Historically, persons engaged in instructional professions in institutions such as colleges and universities have assumed an attitude of immunity from personal responsibility for any accidents which may have occurred during courses of instruction under their supervision.

In part this attitude has been engendered in institutions of higher learning by the assumption of intelligence on the part of the recipients of the instruction and in part by the judicial and legislative theories of sovereign and charitable immunity.

Under the doctrine of sovereign immunity a state cannot be sued without its consent, and the general rule is that a state college or university is considered to be an instrumentality of the state and hence is also immune from tort liability where there is no constitutional or legislative provision to the contrary. However, as to the personal liability of officers, professors or other employees of a state college or university no general rule can be enunciated. Under the rule in some jurisdictions to the effect that public officers are not liable to individuals for the consequences of acts performed as a part of their public duties it has been held that the dean, assistant dean and physicians of a state university in the absence of legislative consent to suit, could not be sued by a student where the acts of the deans in ordering the student off the campus and of the physicians in giving out information of the student's mental condition were performed in accordance with the duty of the university to police its grounds and protect its students from improper influences.[1] However, in another jurisdiction it has been held that a physician employed in a university infirmary was not protected by the immunity of the university by which he was employed.[2]

---

[1] Morris v. Nowotny (Tex. Civ. App.) 323 S. W. 2d 301, Cert. den. 361 N. S. 889, 4 L.Ed. 2d 124, 80 S. Ct. 164, reh den. 361 N. A. 921, 4 L.Ed., 2d 189, 805 Ct. 264.

[2] Davie v. Regents of University of California, 66 Cal. App. 689, 227 P. 247.

Similar considerations and dilemmas are present in respect to possible liability for negligence of private colleges or universities and their faculty members and employees. Generally speaking colleges, universities and other educational institutions, although privately established and operated, are considered to be charitable in nature. In some jurisdictions charitable institutions and their employees are considered immune to suit for acts performed as part of their duties. Such immunities have been restricted or abolished in other jurisdictions. The liability of faculty members and other officers or employees of such private institutions will therefore depend upon the law in the jurisdiction where such institution is located and whether that jurisdiction confers immunity or partial immunity upon them for acts performed within the scope of their employment. The law is in a state of change in several jurisdictions with the present trend being toward the abandonment of such immunities.

Of course, the absence of such immunities as to faculty members of either state or private colleges or universities means only that those individuals are amenable to suit. There is always the question whether the circumstances of the injury complained of were such as to result in liability in accordance with the general principals of law. Thus in an individual case where it is claimed that a negligent act of a faculty member resulted in personal injury, before liability will arise, it must generally be found that the defendant faculty member had a duty to exercise care for the safety of the plaintiff, that he failed to exercise such care for the safety of the plaintiff, that such failure was the proximate cause of the plaintiff's injuries, and that the plaintiff was not contributorily negligent and had not assumed the risk of injury. In this connection some jurisdictions hold contributory negligence to be a complete bar to recovery while others, where comparative negligence statutes have been enacted, hold that contributory negligence results in a diminution of liability.

In the light of the development of the law in respect to sovereign and charitable immunities, a prudent person engaged in the teaching profession should now conduct activities under his supervision or control as if no such immunity exists, that is, he should act as if he were subject to the same liabilities as persons engaged in the same industries or professions for which he is training his students.

Thus, where none of the aforementioned immunities exist (and the jurisdictions in which they are recognized become fewer with the passage of time) a college or university is liable for the wrongful or negligent acts or omissions of its officers, agents or employees acting within the scope of their authority or in the course of their employment and the faculty members are responsible for the results of their negligent acts.

Courts have defined the term "negligence" as "the failure to do what a reasonable and prudent person would ordinarily have done under the same circumstances of the situation, or doing what such a person under the existing circumstances would not have done."[3] Generally speaking, negligence is a relative term implying failure to comply with a definite rule of conduct in the circumstances of a particular case.[4] Thus the issue whether a particular act or omission constitutes culpable negligence must be determined in the light of the physical circumstances existing at the time. As one court has stated it, "the greater the danger, the higher the degree of care required to constitute ordinary care, the absence of which is negligence."[5] In a recent case involving the unfortunate death of a university graduate student who was electrocuted by defective newly acquired laboratory equipment, the trial judge charged the jury on the law as set forth in the case of Burdick v. South County Public Service Company, 54 R. I. 310, 172 A. 893 (1934) as follows: "Where death may be caused by an agency lawfully in use. . . ordinary care requires that every means known, or that with reasonable inquiry would be known, must be used to prevent it," that is, "the highest degree of care and skill which foresight can attain, consistent with the practical conduct of his business, in the known methods and the present state of the art." Although it has been stated that negligence is to be determined by considering the reasonableness of the foresight used, not by what could have been avoided by later employing aftervision[6] the liberal trend of modern courts seems to require at least an approach to aftervision in cases involving highly dangerous instrumentalities which may result in serious injury or death. In summary, therefore, the duty of care imposed by law upon those in the teaching profession as well as others increases with:

---

[3] Federal Insurance Co. v. Herreshoff Mfg. Co., 6 F. Supp. 827 (D.R.I. 1934).

1. The probability of injury, i.e., foreseeability and
2. The extent of the injuries which may be sustained.

In other words, a person has the duty of exercising the highest degree of care commensurate with the danger involved.

Many of the reported cases for injuries on college and university campuses have named the educational institution involved as the defendant. In such cases liability has been predicated upon the negligence of an instructor as an agent of the educational institution being imputed to the college or university. The college or university is sued as the "target risk," so called. The individual instructor or professor should not take any solace, however, from this practice. In the cases where liability of a college or university is predicated upon the negligence of an individual, that individual would normally be held to be personally liable had he been joined as a co-defendant or sued alone.

Generally speaking, a person is always individually liable for the consequences of his own negligent acts or his negligent failure to act where there was a duty on his part to take a particular action. However, it is impossible to formulate any general rule as to when a person should act or when a person should refrain from acting.

---

[4] Mandella v. Mariano, 61 R. I. 163, 200 A. 478 (1938).

[5] Lawton v. Vadenaise, 84 R. I. 116, 122 A.2d 138 (1956).

[6] Federal Insurance Company v. Herreshoff Mfg. Company, 6 F. Supp. 827 (D.R.I., 1934).

The most simple cases are those involving an intentional act on the part of the person charged which results in injury to others. In such cases liability results pretty much as a matter of course absent special mitigating circumstances.

Particularly difficult situations arise in cases where the negligence of one person may be imputed or charged to another or in cases of injury attributable to a failure to supervise or to set down proper rules of conduct with due regard for the safety of third persons. A recitation of specific cases will best demonstrate the possible liabilities of instructors in connection with their classroom and associated activities.

In a 1964 case it was held that the trustees as well as the college could be held liable for the death by drowning of a freshman student while attending a swimming class as part of a physical education course if it could be shown that the instructors were incompetent and/or the trustees failed to prescribe sufficient safeguards for the conduct of the swimming class. Presumably, in that case, the instructors could also be held to be individually liable.[7]

In 1951, a prospective student was injured while taking "leg left" tests to determine eligibility for entrance to Courtland State Teachers College. The test was conducted by a senior student in the absence of the physical education instructor. The Court held the college liable because there was a lack of proper supervision which lack constituted negligence. Although the question was not raised in that case, it is conceivable that the college officials and the instructor could have been held personally liable.[8]

In an early Tennessee case, members of the executive committee of a private incorporated university which as agents of the university were charged with the supervision of an office building owned and operated by the university were held liable to a person injured in the fall of an elevator in the building for their misfeasance in permitting the elevator to be operated when they knew, or should have known, that it was unsafe.[9]

In Utah, action was brought against a university alleging negligence on the part of a chemistry professor resulting in injury to one of his students. The evidence disclosed that on the day in question the plaintiff, a female student in the freshman class, with two other classmates went to the laboratory and with the permission of the professor commenced performance of the experiments assigned for the day. The manual used as the text set out fully the materials and apparatus to be used and the steps to be followed in each of the assigned experiments. The first experiment was performed under the supervision of the professor. At the beginning of the second experiment the professor left the laboratory to keep an appointment with another student across the hall. In the professor's absence the students mixed certain chemicals in accordance with their understanding of the directions contained in the manual and applied heat to the mixed chemicals. An explosion resulted and the female student was injured. The Court held that the jury had properly found that it was the duty of the university to furnish instruction and adequate supervision in its students' chemical laboratory; that the professor was negligent in leaving the laboratory under the circumstances of the case and that his negligence was the proximate cause of the student's injuries. Although the suit named only the university as defendant, there is no doubt that liability on the part of the professor would have been found had he been joined as a party defendant.[10]

---

[7] Morehouse College v. Russell, 109 G. App. 301, 136 S. E. 2d 179 (1964).

[8] Brittan v. State of New York, 200 Misc. 743, 103 N.Y.S. 2d 485 (1951).

[9] Gamble v. Vanderbilt University, 138 Tenn. 616, 200 S. W. 510 (1917).

In a California case a teacher conducting an experiment in the chemistry class was held liable for injuries sustained by students where it was found that the teacher was negligent in failing to take proper precautions for the safeguarding of pupils during a dangerous experiment.[11]

In Arizona, a student in an auto mechanics class was injured while he with other students were trying to bend a severed auto top by jumping on it. At the time the teacher had been circulating around the workshop generally overseeing and inspecting the work in progress. The plaintiff had been lowering one side of the car top to the floor when two other students jumped on it and the plaintiff's hand was cut by the metal edge of the top. In that case the instructor was held personally liable for the student's injuries. In discussing the responsibilities and potential liabilities of the instructor the Arizona Court stated:

> "We recognize the physical impossibility of a teacher supervising every minute detail of every project and activity in progress during class session, but we believe that reasonable men might find that a teacher in charge of an auto mechanics class would have given more personal supervision to this somewhat dangerous operation, or would have appointed a group leader to co-ordinate the activities conducted, or both. The very nature of the work required team effort and a synchronization of the various steps necessary to accomplish removal of the car top, and the accident that occurred could very well be found to be the result of lack of coordination. There being no one in charge of the group to see to it that this was accomplished, the jury might have concluded that the teacher was derelict in his duty in failing to appoint a leader and/or in not having unequivocally instructed the boys to 'cease and desist' from any further attempts to bend the car top."[12]

OSHA

In recent times numerous safety codes and other forms of objective standards in respect to various activities have been developed and adopted by state and federal agencies or by professional associations. Where such a code or set of standards is adopted by an administrative agency pursuant to legislative authority, or if after adoption by such an agency, such a code is ratified by the legislature, the code has the force of law and its violation, in addition to exposing the offender to stated criminal penalties may, in a civil action, constitute negligence per se, or at least evidence of negligence, where injury results from such a violation. As an example, in a California case a student received injuries when his hand was caught in a printing press which had not been equipped with a safety device required by regulations of the State Division of Industrial Safety. Although the regulations had been promulgated for the protection of employees, the California Court held that violation of the regulation by failing to provide the safety device was in itself negligence as to the injured student and ordered judgment to be entered against the teacher involved, the school principal and the City Board of Education.[13]

---

[10] Brigham Young University v. Lillywhite, 118 F.2d. 10th Cir. (Utah) 1941. Cert. denied 314 U.S. 638.

[11] Damguard v. Oakland High School Dist. (1931), 212 Cal. 316, 298 P. 983.

[12] Morris v. Ortiz, 3 Ariz. App. 399, 415 P.2d 114.

The most detailed and all encompassing legislation establishing safety standards and regulations must be the Williams Steiger Occupational Safety and Health Act of 1970, generally referred to as OSHA, which was passed by the Congress of the United States in December, 1970 and became effective on April 28, 1971. With some exceptions, the act, together with the regulations and standards promulgated thereunder, applies to all employment throughout the United States and its possessions. The stated purpose of OSHA is "to assure so far as possible every working man and woman in the Nation safe and healthful working conditions and to preserve our human resources." There is no doubt that private educational institutions and their employees are subject to the provisions of OSHA. Since the act in its definition of "employer" specifically exempts any State or political subdivision of a State, it would appear that State Colleges and Universities are not subject to OSHA regulations. However, faculties of such state operated institutions should recognize that this immunity, although probably protecting them from the fines and other sanctions of the act, will probably increase their potential liability in civil suits for personal injuries, as will be later discussed.

Regulations promulgated under the authority of OSHA set forth detailed standards in respect to almost every conceivable activity. Some of the standards apply only to certain stated industries and are generally referred to as "vertical standards." As an example, the construction industry has a specific set of standards with which it must comply. A university or its faculty would normally not be concerned with these special "vertical" standards. However, the act does regulate a myriad of activities and situations which apply to all industries or occupations generally. These regulations are often referred to as "horizontal" standards and are equally applicable to the activities of colleges and universities and other professions and industries.

As examples, certain sections of OSHA regulations establish minimum housekeeping requirements as to walking and working surfaces for protection from slips, trips and falls.

---

[13] Lehman v. Los Angeles City Board of Education, et al (1957), 154 Cal. App. 2d 256, 316 P.2d 55.

Another section establishes minumum standards for protection from exposure to gases, vapors, fumes, dust and noise radiation.

Another section prescribes practices for handling, storage and use of hazardous materials such as compressed gases, flammable and combustible liquids and explosives.

OSHA also requires in certain circumstances personal protective equipment for the head, eyes, face, respiratory system, etc.

Other regulations provide minimum standards to insure that medical and first aid services will be readily available in cases of emergency.

OSHA regulations refer to such matters as fire protection, compressed gases, powered machinery, hand and portable power tools and electrical installations and equipment.

The act provides in section 17 severe penalties for violations. Subsection (a) provides that any employer who willfully or repeatedly violates the act may be assessed a civil penalty of not more than $10,000. for each violation.

Subsection (b) provides that any employer who is guilty of a serious violation shall be assessed a civil penalty of up to $1,000. for each violation.

Subsection (c) provides that a fine up to $1,000. may be imposed against an employer for a violation not deemed to be serious.

Subsection (d) provides that an employer may be fined up to $1,000. for each day during which a violation continues in existence after a citation for that violation has been issued.

Subsection (e) provides that an employer who commits a willful violation of the act which causes death shall, if convicted, be punished by a fine of not more than $10,000. or by imprisonment for not more than six months, or both.

Until this point the penalties provided are for violations by an employer and the logical question arises whether a member of the faculty of an educational institution is considered under any circumstances as an employer. Unfortunately, procedures under the act have not been sufficiently developed so that an exact determination of who the responsible party would be in a criminal prosecution cannot be forecast. The imminent danger section of the act refers to "a workplace under your ownership, operation, or control." Conceivably, therefore, the act could be interpreted to provide sanctions against a faculty member where the violation occurs in an area under the control of that faculty member.

An equally unanswerable question is whether an injury to a student could result in criminal sanctions under the act. By its terms the act is designed for the protection of employees and a strict construction would not include students in that category. However, until further judicial interpretation of the act is made, these questions must at the present time remain unanswered.

Section 17(g) of OSHA provides a fine of not more than $10,000. or imprisonment for not more than six months, or both, for any person convicted of making any false statement, representation or certification in any document filed or required to be maintained under the act. Faculty members clearly come within the prohibitions of this section. The most probable situations which could result in the sanctions of this section could occur during the walk-through inspection of the premises by an OSHA inspector.

The greatest significance of OSHA regulations for faculty members is in the area of civil actions for personal injuries where it is alleged that failure to comply with OSHA regulations constitutes negligence. Cases of this nature may arise where required protective devices are not provided on machinery used by undergraduates or others under the supervision of a faculty member. Other situations of potential liability may arise from failure to comply with standards as to individual protective equipment, chemicals, electrical apparatus or conceivably even as to housekeeping in classrooms or laboratories. Although, as previously pointed out, OSHA regulations do not apply to state colleges and universities, such regulations may well be considered as the reasonable and proper minimum standards for the various activities covered, the violation of which may subject the personnel of such institutions to individual civil liability where no immunity to suite exists. It seems, therefore, to be incumbent on a university or college instructor to familiarize himself with OSHA as well as other state and municipal regulations pertaining to instrumentalities and activities under his control.

The foregoing has been a somewhat broad brush approach to the subject of faculty liability in tort. In summary, the faculty immunities of yesteryear are fast disappearing and the general rules of tort liability are increasingly applicable to members of the academic community. The present day faculty member must be aware of the fact that he is liable not only for his own acts or failures to act, as the case may be, but in many cases may be personally responsible for the acts or failures to act of others who may be under his control or supervision.

DEVELOPMENT AND OPERATION OF A SAFETY PROGRAM ON THE SMALL COLLEGE CAMPUS

Leonard Vanderveld, Jr.
Chief Safety and Security Officer
Baptist Bible College
Clarks Summit, Pennsylvania

The three essentials in providing a successful safety program for the small college can be thought of as the three T's - Treasure, Talent, and Time.

Treasurer: A thorough and complete safety program is going to cost money. It means salaries, equipment, and uniforms. It means that it should be a budget item, despite all of the other demands placed on the strained financial situation of the average college. Although used and surplus equipment may be perfectly satisfactory and the persons responsible for the program are real "scroungers," there still has to be some recognition by the administration that safety is a legitimate expense. How can you measure in terms of dollars and cents, the comfort and satisfaction your students and their parents feel when they know that you are doing all you possibly can to provide a safe and secure "home away from home?" How can you measure the appreciation when an accident or injury is prevented or minimized by alert, trained personnel?

Time; Most small colleges cannot afford a full-time safety person. Usually it is an additional responsibility for some already busy administrator, faculty member, or staff member. If this is true, more than likely the safety emphasis will be weak because the time available to really do the job is minimal. The administration must face its responsibilities in providing a safe and secure environment for its people. If it honestly recognizes these responsibilities, it will provide the time for someone to develop a complete program.

Talent: Any successful safety program requires a leader who cajoles, convinces, pushes and drives to make the program succeed. Recognizing the financial restrictions and the fact that the position will be probably only part-time, there is still the need for someone to assume the responsibility for selling and developing the program. It is not absolutely essential that this person be the graduate of a college-level degree program in safety. It is important that he have an enthusiastic interest in the field and take advantage of every opportunity to broaden and deepen his background. It is also necessary that he have the confidence and support of the college administration.

In the remainder of this presentation, we would like to present to you how one small college has sought to handle its responsibilities in the field of safety. It has a minimum of Treasure, Time, and Talent, but has attempted to use what it does have to the fullest.

SITUATION: At 10:30 p.m. student Mary Jones took a break from her studying to move a load of her clothing from the washer to the dryer in the basement laundry room of her dormitory. Unknown to her, the dryer had been in constant use all evening and a heat regulator was not functioning properly. When she turned on the dryer there was an explosion of dust and flame that knocked her against a wall and caused burns on her hands and arms. The heat that was generated set off a sensor in the ceiling and the dormitory fire alarm began to ring.

Other occupants of the dormitory started evacuating the building immediately. The supervisor of the dormitory phoned the campus police officer on duty that there was a fire in her building and then went outside to take a roll call and check on her girls. The campus police officer, by following emergency procedures, alerted members of the campus police, first aid squad, and fire company. He then began to phone other emergency numbers, including the Chief of Safety and Security, the college nurse, off-campus members of the police, first aid, and fire companies, Dean of Students, and President.

A rescue team of four men from the fire company went directly to the dormitory involved and started a systematic search of the building for stragglers, casualties, and the source of the fire. In the meantime, 10 members of the first aid squad had assembled, loaded two ambulances with equipment, and reported to the scene of the fire where they stood by to receive casualties. The fire company's pumper truck and eight men arrived and began laying hose lines from a nearby hydrant while others prepared ladders and booster lines for service. A few minutes later the tanker truck drove up and its three man crew began to prepare for supply of additional water if needed.

At this point the Chief of Safety and Security arrived and assumed command of the operation. Off-campus company members arrived and joined their squads. Off-duty campus police were assigned to cordon off the area and keep the crowds at a safe distance. The college nurse also arrived and assumed leadership of the first aid squad.

In the meantime members of the rescue squad were searching the dormitory room by room and discoverd Mary Jones. She was quickly placed on a stretcher and taken outside the building, where the first aid squad assumed responsibility for her. Diagnosis was made by the college nurse and treatment was started. A crew was assigned and one ambulance left for the hospital. The remaining ambulance and crew members continued on duty to handle further casualties.

The Chief of Safety and Security, with the leader of the rescue squad and the captain of the fire company, surveyed the fire scene and decided to use fire extinguishers if possible to extinguish the fire. Electric power was turned off and two booster lines were laid inside the building in case they were needed. In a few minutes the fire was under control. After careful inspection of the entire area, the dormitory was declared safe. Students were allowed to return to their rooms and cleanup began. The first aid squad and fire company reassembled their equipment and held a critique of their actions. In a short time the campus had returned to its normal activities.

DEVELOPMENT: The emergency situation described above and the response to it did not happen at a large, well endowed university, but was an actual drill planned to test the efficiency of the safety and security units of a small Bible college with 600 students in the northeastern mountains of Pennsylvania. With the exception of the Director of Safety and Security and the college nurse, every participant was a student.

When the college moved to its present campus four years ago from the middle of a large urban area it was soon realized that this was a "whole new ball game" as far as safety and security were concerned. The college was now a small community of its own. The city fire company, police, and hospitals were no longer down the street, but miles away. Either the college would have to rely on the volunteer fire companies and first aid squads and minimal police protection in surrounding communities, or develop their own.

After much study, it was determined that the college's responsibilities to its students, employees, buildings, and equipment were such that measures would have to be taken to provide for its own safety and security. A Safety and Security Committee was formed with members including the Dean of Students representing the student affairs area; the Business Manager representing the building, grounds and operations aspects; the President as the chief executive officer; and the Chief Safety and Security Officer, a part-time position for one of the faculty members, who was the Chairman of the Committee and the supervisor of all safety and security personnel. The size of the Committee was purposely kept small so that meetings could be called quickly and informally, if necessary. The President's presence gave the committee access to him, so that quick decisions could be made when necessary.

SECURITY: Although there had been no problems with trespassing or mischief on campus, it was felt that a campus police force was needed. Brief contacts with local private guard organizations proved too expensive and an attempt to use students as night watchmen was unsuccessful.

The Committee carefully screened a large number of applicants from the student body and selected 12 men. This was a time consuming effort, but it was strongly felt that the right personnel were absolutely essential since this was a new step for the college. It was important that these men be respected by faculty, staff, and students alike. It was also necessary that they were neat, well-groomed, and physically large enough to present a positive impression. Since they would often be the first persons that visitors to the college would meet, they had to have a friendly, courteous manner. Being students themselves and yet having to deal with other students in their role as campus police officers required considerable tact and self-control.

A petition was made to the county court that under state law these men be appointed county police officers with full police powers on the campus only. This gave them as much authority as any local police officer and the permission to wear a full police uniform. Each man was uniformed at a cost of about fifty dollars per man. Winter coats, raincoats, boots, gloves and other equipment were also available. Later a captain, lieutenant, and one sergeant were appointed to provide supervision. Training is continuous and consists of attendance at state police courses, FBI workshops in various subjects, and classes conducted by the local police chief. Each police officer works about 20 hours a week and efforts are made to adjust his work schedule to his class schedule. Some men work full time all summer and during other vacation periods.

The campus police duties include campus security, particularly in the evening hours and on weekends. This includes screening all personnel and vehicles coming on and off campus, maintaining a switchboard service from 5:00 p.m. to 8:00 a.m. and all weekend, locking buildings and doors, serving as a fire and safety watch, making regular rounds of the campus facilities, escorting visitors on tours of the campus, and serving as an information center for the college. The police also are responsible for campus parking, including issuing of tickets for violations, supervision of student vehicle registration, application of bumper stickers, and providing accident prevention information to student drivers.

In four years' experience with this type of approach to campus security, it has been found to be an economical and efficient method of providing a very complete service. The very presence of a uniformed officer has been a factor in preventing disturbances. The public relations factor alone has been a distinct plus and many favorable comments have been received by visitors and prospective students. Cooperation with state and local police has been excellent.

HEALTH SERVICES: The distance to the nearest hospitals and the necessity of relying on local first aid squads who were efficient but often undermanned, especially in the day time, required the college to examine its responsibilities in this area.

First a college nurse was hired part-time in the mornings and on 24 hour emergency call. A dispensary was opened during the morning hours and the nurse visited stick students in the dormitories. A busy interscholastic and intramural athletic program soon resulted in a number of casualties, such as broken bones, concussions, torn ligaments, etc. It was soon realized that additional help was needed. An excellent American Red Cross instructor was contacted and soon the basic and advanced first aid courses were offered to students once each semester as an evening course. Out of these classes came volunteers to serve on a first aid squad directed by the college nurse.

Interested individuals contributed two used ambulances and other equipment, such as stretchers, splints, and medical items. First aid squad members were invited to join the Northeastern Pennsylvania Volunteer Ambulance Association and participate in medical seminars at local hospitals and training excerises in first aid and rescue work. A regular schedule of campus drills, films, and classes are held. Present members include two registered nurses who are students and two former Army medics with Viet Nam experience.

The first aid squad provides a four man crew and ambulance at every home athletic event and off campus social event. Injured athletes and other casualties can be treated immediately and transported quickly to a doctor's office or hospital. This prompt attention has resulted in limiting the seriousness of a number of injuries. There is a four man crew on 24 hour call each day and the entire crew of about 20 students can be quickly summoned by prearranged bells and phone calls. Squad members also report for all fire drills and fires. They carry trays of food to students sick in the dormitories and report to the college nurse any sick or injured. Students who need special medical or dental attention are escorted by squad members to the hospital or doctor's offices. On several occasions, seriously injured students have been transported by ambulance from the college or local hospital to their home by the first aid squad. This has involved trips as far away as 1,000 miles and resulted in considerable savings to the student and his family. This service is also extended to faculty, staff, married students, and their families.

With the assistance of student volunteer help, the college maintains a very complete and thorough health and emergency service for a minimal cost. In addition, first aid squad members are receiving valuable training and experience that will always be helpful to them. There is also the good will of parents and families of students who know that their children who are on campus will have immediate and competent attention in case of illness or accident.

FIRE SAFETY: A series of stubborn grass fires in the open fields of the 153 acre campus and the need for a regular program of fire and safety inspections, prompted the college administration to seriously explore its fire fighting resources and fire prevention programs.

Under the direction of the Safety and Security Committee a volunteer fire company was established. An alumnus found and purchased a used fire truck which he gave to the school. This was an old but efficient pumper with a 1,000 gallon water tank and sufficient hoses, ladders, and other equipment. Later a 1,050 gallon tank truck was given to the college by a local fuel oil dealer. This gave the fire company mobile fire fighting equipment and a water supply for any location on campus.

A number of the fire company members attended fire fighting classes at a local fire house and the Chief was sent to the State Fire School for two summer courses. Members also attended an FBI workshop on bomb scares. Constant drills are held for drafting water from the lake and swimming pool on campus, ladder work, hose lays, and simulated incidents that require all emergency units to work together, as described in the beginning of this presentation.

A team of rescue men have been trained in first aid, emergency rescue techniques, and fire fighting. Their job is to clear out personnel, remove casualties, and find the source of the fire. These men are carefully selected for interest, knowledge, and physical condition. They are the elite of the fire company.

Another team has been trained for fire and safety inspection. At least every other week a pair of inspectors will check every room and every building on campus. They will look for unsafe conditions and practices, such as lint filled dryer, too many electrical appliances on an outlet, loose carpeting, exit lights that are out, and similar problems. Written reports are submitted to the Chief of Safety and Security who channels them to the proper persons. This same group inspects, recharges, and refills all campus fire extinguishers, except carbon dioxide ones. This results in considerable savings to the college.

Members of the fire company supervise all fire drills. These are held in all dormitories and other buildings at various times of the day and night. Kitchen personnel and other staff members are instructed in the use of fire extinguishers and evacuation. At least two firemen are on duty at all large gatherings on campus to handle fire safety and supervise evacuation, if necessary. Fire company personnel are also responsible for setting and extinguishing all bonfires, trash and grass burning.

The college also has a group of students who have been trained by the conservation officers to fight forest fires. This crew of about 30 trained men and about 30 partially trained men is on 24 hour call to respond anywhere in the state to fight a forest fire. Their training and equipment is a valuable supplement to the campus fire company.

It is realized that this fire company is limited in its abilities and equipment and that it could not handle a large scale fire. However, if by quick response and knowledgeable action, it could attack and hold a fire until additional help arrived, perhaps unnumbered lives and much valuable property might be saved.

Here again, using mainly volunteer student assistance, a major responsibility of the college - fire prevention and safety - is provided for, not only at low cost, but in an efficient manner that has impressed the fire insurance companies who insure the college and the local and state fire authorities.

Summary: This presentation has attempted to show how a college with a small enrollment can establish and maintain a comprehensive safety program. Not all problems have been solved, but if the administration will provide the Treasure, and the Talent has enough Time to do the job, then much can be accomplished in providing a safe and secure situation in any small college.

SAFETY REVIEW OF ARCHITECTURAL PLANS

J. P. Eaker
Director, Risk Management
University of Wisconsin

The business of the review of plans and specifications is something that should be automatic on the part of our universities and colleges. That is, the safety man should be given the privilege...no, not privilege, it should be made mandatory that there be a safety review of all plans and specifications prior to the time the final drawing is made. It is true all of us are not engineers, but all of us can learn how to read, look for, and make recommendations on certain major types of deficiencies on plans. After all there are a reasonably limited number of things we have a real vital interest in. The majority of the other things we must take for granted that the architect and the engineer consulting group who put together the plans know what they're doing. We're not going to get ourselves involved, for example, in concrete mixes. Specifications call for it and we assume that they know what they're doing. But what ultimately they have done with this concrete mix and what it has turned itself into by way of a building is something else again. These are the things that I think we should become aware of. In this section I don't propose to give a short course in blueprint reading at all, but I would like to run across, very quickly, plan specifications, put a set of plans up on the board, and show a couple of things which you can look for. A fault or two that was found, how you recognize those faults, how you check to see that the fault does not actually exist in the plan. Of course, you then have to go back and check the finished product to find out was it so, did they actually do what it said on the plan. In the beginning in looking at things we talk about specifications.

When we look at specs - you hear the word specs - specifications are nothing in the world but a narration of what, when, who, why, and how. Does that ring a bell with anybody? That's all it amounts to. That's what your specifications are: they're your contractual documents. In detailed, written form this is what's going to happen on this construction; this is what it's supposed to be. You look in your specification for such things as the fire extinguisher - what kind of fire extinguisher shall they be? What make? They even specify the make in there. Fire extinguisher cabinets - what kind of hardware it shall be. The description of the hardware, on doors, and the like. These things are all in your specifications. They're the writing; they're where you can go for the minute detail. You don't go to blueprints for that.

Now let's talk about plans. These are the drawings. The specifications, the concepts of the building planners are reduced to a set of drawings so that the contractors can go to work on them and build something. You can't build it from a narration; you have to have some drawings to go from. I have several sections up here and I'm probably saying a great deal that most of you already know...We find that architectural plans usually are drawn up in several sections. The so-called A sheets of the plans are the architectural, they're the architectural sheets. They're the sheets which show you the general design of the building - what it looks like, its shape, its framing, the structure, what the thing looks like and its layout for each floor. On these architectural plans you'll also find where your fire extinguisher cabinets, for example, are located that will be put into there. It should be marked out on your architectural plans where they are. In most sets of plans the fire extinguisher cabinets are merely marked F.E. cab., sometimes they write the whole blinking thing out - Fire Extinguisher Cabinet - or use other abbreviation. I would like to digress just a moment and say that after you have read the specification and before you begin to look at the plans in detail, as you go to each section of the plan, as you go to the architectural section - the A section -, on the first sheet, you will find a set of symbols and these symbols you may use then to interpret what it is on the plan. We'll go over the symbols part of it in a little bit when I show you a sheet on the wall. The same thing applies in all of the other sections of the architectural plan. On the first sheet or on one of the first sheets, before you get into the drawings themselves, you're going to find all of these symbols that refer to those things that are architectural, the things that are structural -- the structural, the framing, the steel, the what-have-you. Next, plumbing -- plumbing has its own. Heating and ventilating has its own. Electrical has its own. These are all separate sheets on any large and detailed set of plans. Separate sections. Generally speaking there will be a sheet for each individual floor. Sometimes there's more than one sheet per floor. Within each of these there will be certain detail. These are the things that you review. This is what it amounts to. When you review a set of plans and specifications, you're reading the narration and looking for these things that you think should be. Your fire extinguisher cabinets, your sprinklers, this sort of thing. Now you're looking at architectural plans to see how this building is laid out - the structure, what it's made of, the plumbing, how is your plumbing put into the building, what is it. Remember, in the plumbing, this is where your fire lines are indicated, where your fire water risers...Do you have risers going up? Have you got connections in the building? This is where you find out - from plumbing plans. You look for the symbol on your symbol sheet and you go on the plan and you hunt for it. Do we have the piping in there? Do we have the sprinklers in there? Do they show? Are the sprinklers where you feel they should be?

I'd like to mention one thing about that at this point. We talked about are they where you feel they should be. Remember gentlemen and ladies, these are each separate sheets and the plumber does not talk to the heating and ventilation man and sometimes it would seem that the architect doesn't talk to any of them. He just takes pieces of paper from them. The electrician refuses categorically to speak to the plumber; he belongs to a different union. The net result is once in a while you will find, if you have not done so on the prints, but you can look at a finished product - and I've run across this in one of our more beautiful buildings, on the wall was a nice great big circuit breaker box. It was twenty by thirty inches and running right down across it were three one-inch water pipes. Three inches out in front of it. You could no more get into that circuit breaker box than...it couldn't be done. Just out of curiosity I asked the plumbing contractor. He said, "Hell, nobody told me to do anything different. This is where it showed on the prints, that's where it goes."

May I point up that some of the things that we may do when we run into something that might be critical...We might, for example, - and we'll have an illustration of this a little later, in this instance, have looked at the plumbing sheet for that particular floor, for that particular section, looked at electrical.

Another circuit panel, larger yet, just inside a mechanical room to the left, as you go in the door, to the left there's the panel. You go to turn around to hit the panel and you go through a three by three foot opening in the floor. What's the opening there for? Grilled, fine. They went all the way down so that they would be able to service this. At some point or other the architect said, "Well, they were supposed to put a grill in there." Well, I said, "Who designed the grill? Where..." "Well, we didn t do it." It made it a little awkward to get at the circuit breaker box until we got a grill put in there. These are just a few of the kinds of things that if we don't look at the prints ahead of time - and incidently that hole would show on the architectural sheet and you would see it checked out on the electrical sheet and you would see that the circuit breaker box was sitting right up on top of that hole.

Now, if you looked out among the plans, you would say, "My goodness, you can't put that circuit breaker box in that hole in the floor." Of course, not, it's on the wall. These are the kinds of things that one should look at. As I mentioned, they often seem awfully silly and you wonder how in the world can a person do it but it's easy. It's easy for the simple reason that to put up a set of plans, for example, for this building right here, you had consultants, you had an architect who was riding herd on the whole thing, you had a firm of consulting engineers who were taking care of the structure part of it, a plumbing contracting firm, heating and ventilating consultants, electrical consultants - they don't even talk to each other sometimes. Once in a while they do, it would seem. I'm not trying to belittle the engineering profession; they've got problems too. Haven't we all. These kinds of things are the kinds of things that come within our province. What is our job? To hold fault, where it is a safety factor, to a minimum, isn't it? Therefore, whatever we need to do this is part of it.

I'd like to put a print on the board and go along from this thing that I put up there. Let's start off here with an A sheet. Now this building was a library, it was our campus library. We built a new one and we had a major remodeling of this building to turn it into a, for lack of a better word, a general-purpose building. That's what it turned out to be, in any event. But we put into this building additions and records, student activities including the Dean of Student Affairs, the counseling service, student testing, and all that sort of muck. This was a basement and two stories. I'd like to run over a couple of these sheets of this particular building, although not a new building. The remodeling was so extensive. You must remember that from a library, from the inside, once you take the stack shelving out you have nothing but a flat floor with some pillars in there to support the floor above. So to use for anything else requires some extensive remodeling and this is the kind of thing we're talking about. I hope all of you in the back can see, although this is the best I can do. What I would like to point out to you, if I may, are just a few things about this particular floor that as a safety person we would want to look for.

One of the primary things we're going to be concerned with...This is admissions and records and counseling and there's going to be an awful lot of traffic in there. There's going to be a lot of people in that particular building from time to time. Students, primarily, are totally unfamiliar with the place. What are we concerned with then? Ways to get out, aren't we. In other words, fire spread control devices - doors that will halt or at least restrict the spread of fire, labelled doors. I talked about looking at symbols a while ago and I'll talk about doors here for just a moment, if I may, and I'll point out a few doors to you and I'll show you. Here's door number one. Notice the hexagonal symbol; that's pretty generally used as a symbol for doors. Not particular kinds of doors, just plain doors. The hexagonal symbol...door number one here is on stairs, door number six also stairs. These doors you should check out and should be labelled doors. The stair is supposed to be enclosed and that is a fire-safe place to be, for people to go down the stairs. So these should be labelled doors. I would look at door number three, door number eight, and door number thirty-three which you can't read. There is a mechanical room and two electrical rooms. They too have labelled doors, but B label doors - hour and a half. I'd point to you up here door number four. Door number four means nothing, if you're just at that set of prints, unless you know what else is going on. This is the outside wall of the building. This door number four is a separation between this building and another building. The fire code says, "This shall be an A labelled door." Otherwise, it wouldn't have to be, if it were just a normal exterior door. But it's not. This is a fire separation here and so you need an A labelled door. Now I point these doors out to you just so we'll go back to symbols and see are they in fact in the plans, are they designated as such. Also, for future reference, if you'd bear in mind this area right here. We're going to come back to that a little later.

This is where a problem arose. If you bear in mind that we talked about some doors. O.K., this is a remodeling job. As such, when it comes to labelling facilities and the like, they do not label anything except that which is new. If the one thing is not new, they merely retain the existing. That's what you're looking for. If the door was an A labelled door before and it says existing door, you know it's an A labelled door now because you're using the same one again. If it's your facility, you probably know these things. Door number one and door number six I said were A labelled doors; they opened onto stairwells. Door number one, existing door. It already was the labelled door. I know this so it checked out. All I had to do was wait until the construction was finished to find out did they put the darn door back on again or did they change it - that happens. Door number six, the other stair at the other end of the basement, existing door. Door number eight, into the mechanical room, existing door. Now, let's look -- door number three and door number four. Look over here on the door schedule. Is it a labelled door? If you're going to have fire-rated doors, there is a column in your door schedule for that purpose and every new door to be installed that is a labelled door will be listed in that column with its label, what it is. You'll note that number three is a B label - one and a half hours. Remember that door number three was also to a mechanical room. Now, this mechanical room was a new one that was installed; it wasn't there before. Therefore, we find that we're not talking about an existing door, are we? The same thing applies in door number four. This is an A labelled door. Door number four, as you recall, was the fire separation door into the next building. We find that's A labelled and they went back to the remarks and said, "A label and hardware." Special hardware required for an A labelled door. You can go all the way down the line on this. This is one of the schedules, one of the explanations that you have, one of your means of checking in your architectural prints, your door schedule.

When we had the presentation on the fire earlier and they talked about the ceiling ...I think that it would be a good thing for us to take note perhaps. Here is a room finish schedule. It's another one of the things that you have. Again this is one of the things that you use to check what is being done. It's very difficult to read, I'm sure. I'll just point some columns that are in use. Over here is the number of the room in the basement, here is what the room is supposed to be used for. Corridor - this was equipment room, faculty office area, a stairs, a storage room, mechanicel equipment room, on down the line. Here we have a testing room and a reading lab. I call your attention to remember those. Remember that area that I drew a circle around and said we would come back to. That's these two rooms right here. The plans, the door and the room reading schedules said this was a reading room and this is a testing room. Some strange things happened between the time they put these things on paper and the time they really begin to do construction. Somebody changes their mind and decides that isn't what we're going to do with that room at all, but they don't do anything about the prints and sometimes don't even tell the architect that they intend to change the use of the room.

What's the floor finish. Again we find the existing here. Existing, asphalt tile, right down the line. It's an existing floor, patched only in a couple of places. They had to patch in here existing tile. Things that are important in the ceiling regard. Don't get hooked with your combustible ceiling. What do we have here? Act. - Acoustical tile. It doesn't say anything about the fallibility, does it? It just says acoustical tile. Now you go back to the specs and we find that this is mineral fiber. We're not concerned now with the fallible or rapidly burnable acoustical tile in the ceiling that had been discussed in our fire presentation. The ceiling...it's very critical to check this. Very, very critical. I think these are the things that are most critical. Is your floor compatible with use?...Are they putting in some kind of idiotic ceiling?...You find on the prints that this is a suspended ceiling and, of course, as soon as you find suspended ceiling, you start asking yourself all kinds of questions. How are they going to suspend it? One of the favorite ways is suspending it from the water pipes. Somebody must be familiar with that. They suspend it from water pipes, from electrical conduit, anything else that happens to be where that wire needs to go. It saves putting an anchor in the ceiling. It doesn't help the ceiling worth a hoot particularly when the electrician has to come along and do some work and remove that piece of conduit or the plumber has to break into that pipe and there goes a hunk of ceiling. This is the kind of thing that we look for.

I won't bore you with the rest of the detail on the room finish schedule merely to show you what you need to look for and at. I would just like to point up one thing only. This is the second floor of that same building. I'd like to point out to you only a couple of things here. Again, we have the stairs and again we check on the doors. Here are stairs. Now, we note here...This happens to be a second floor walkway, enclosed walkway connecting this building, the library with our main building, called Mitchell Hall, here. The two connect by this second floor walkway, enclosed...Right here, the plan said there's an overhead rolling door. It said the door is A labelled. An overhead rolling door, a fire door. These doors then are A labelled also. These were not going to be A labelled; these were scheduled to be ordinary doors. These over here, however, were going to be A labelled. The concept was that this was a stairwell; this whole thing is one continuous enclosure. Therefore, you put the labelled doors here, you've got your overhead fire door here and therefore the whole thing is a fire safe area. I asked that we put labelled doors here to give this an out-of-building - and it's a pretty good sized structure - place for a group of people to go in an emergency and if worse comes to worse, they could break out into here and go into here and if they had to get out of there, it's only nine feet to the ground. They could open the windows and drop out very easily from here. But we have this same kind of thing - all of this is turned into record keeping. Now I would point out that this being the second floor, there's a good number of doors...These look like doors - here, this marking - but they actually are gates. That's all forty inch partitioning all the way down with a bunch of gates in them. They had these gates double swinging into the corridor. Well, the corridor itself was only four feet wide. The gates were thirty-six inches wide. What happens? Some gal working in here comes swinging out of this gate and swings the gate out and slams it right against the knees or the belly of some student walking along there. You know, people are supposed to look, but sometimes we don't ...I requested that these gates be made to open inward only normally, but with a little break-out latch so that in emergency, if they hit that gate at all - walked against it - it would break out and swing out and they could go. Another thing we could do on doors. These are the things you can find and look at. I talked about the overhead rolling door and I mentioned to you about details.

This is one of the instances in which you can look at a detail and find out what it is. This is a detail of construction. Notice here A labelled fire shutters. Down in here a note - A labelled fire shutters. Tracks, angles, and bolts to be supplied by the door manufacturer, the fellow that manufactures the shutter, which means that the entire unit is going to be a fire safe, A labelled unit, the whole business. It all goes together and it all has to be supplied together. One point, and I missed this in the first go around, didn't catch this at all until the installation had been put in. I went to look at it, and I looked up at it and I said, "Where the hell is the fusible link that lets this door close automatically?" There wasn't one. There...Nowhere in the plans anywhere did it call for a fusible link to be installed on that door. Now you can run over to the door and lower it by hand, you can pull it down, but it would not close automatically. You could trip it and it would come down, but not automatically. It had to be a manual operation so I asked that a fusible link be put in and, no problem, the fusible link was put in. But this is another instance you can look for. Any time that you find doors that are normally open, that are supposed to offer fire protection, you had better start looking to see if there's a fusible link there. It would help even more if you start looking if there's a way to let the door close all the way. Sometimes we aren't able to get the doors closed.

(NOTE: This presentation was taken from a tape recording.)

LABORATORY SAFETY

Warren H. Munroe
Manager of Safety and Security
The Rockefeller University
New York, N. Y.

In today's world, laboratory safety is one of the most challenging and interesting problems for the safety professional. Two forces make this so: the improved state of our technology to make it possible to know of and reckon with a wide variety of hazards, and, of course, the Williams-Steiger Occupational Safety and Health Act, otherwise known as OSHA. These two forces will be acting upon us in the next decade to develop an analysis of problems and solutions to those problems which heretofore had been the sole and complete province of the laboratory scientist. Dramatic changes are in the offing.

Before we look to the present or the future with respect of the laboratory, let us first look at the past. What is the laboratory, and where did it come from? In the 16th and 17th centuries, it was the domain of the busy alchemist who was avidly working in his restricted area to perfect the Elixir of Life, or to turn base metals into gold. These were thought of as worthy objectives, worthy, at least, for the support of the patrons who sponsored these rudimentary origins of the laboratory. Such was the start of the laboratory. Generally speaking, the laboratory of the 18th and 19th centuries was housed in structures which were designed for other purposes, into which was introduced makeshift ducts to carry off the noxious fumes and gases, open lead gutters to carry away liquid wastes, and with sky lights or large windows to provide what illumination there was for the research at hand. In the 1870's, one lecturer was quoted as saying, "In the opinion of those best qualified to judge our chemical laboratory, it was badly ventilated, badly lighted, badly drained, and quite unfit to be occupied for many hours daily." Ideas on laboratory design were not lacking in the first half of the 19th century, but in spite of many alterations, changes failed to keep pace with these ideas. With but few exceptions, the modern laboratory, as we know it today, did not appear as part of a building specially designed for research or educational training in this country, until about 1910. Design characteristics included widely varying judgements as to what this new type of structure should contain, how it should be built, and, of course, how it should function. Today, we have some of these important questions still with us, but the form of the problem is more refined and the answers are very complex.

Any overview of the laboratory, its function, and its design, must lead our thinking into planning and design of that area to perform certain tasks in a certain manner. The true role of the safety engineer must be one of predictive involvement with the engineering and initial layout of the laboratory, if any or all of these problems are to be solved. He must work with the scientists and architects in the early stages of planning, and must be able to submit his ideas and recommendations before the fact in order to design out as many problems as his experience and education in accident prevention will allow. This also means that the researcher or educator who directs the thrust and actual operation of the laboratory will think long and hard as to what the future use of such laboratory facilities might be in decades to come.

Unlike the laboratory of but a few decades ago, our laboratory of today (and of the future) contains and will contain ever increasing numbers of machines requiring huge amounts of electricity and, in turn, generating high levels of heat and noise to pose additional problems for health and safety. Ventilation and cooling is a basic problem. Other major problems in this area concern the emission of dangerous rays, ground leaks and shocks, and basic equipment design or later modifications made by the laboratory to negate the intentions of the manufacturer or the safety standard which might apply. Computers, electron microscopes, lasar rays, and the prevalence of the cathode ray tube opens many areas for investigation and serious concern, not to mention electrophoresis apparatus and other types of machines which require consideration of interlocks, grounds for live and static charges, and possible passages for shock or the breakdown of levels of insulation.

The classic problem of the student who mixed H_2SO_4 with $KClO_3$ may not be a worry to most of us; however, the storage of chemical supplies within and outside of the laboratory continues to be a major area for concern. Invariably, explosion-proof motors and switches do not abound in most laboratories, and the critical incident produced by inserting or withdrawing a pronged plug in a receptacle may be sufficient to cause a major explosion if the wrong solvent or chemical has caused explosive limits to be reached. There appears to be over concern with the use of explosion-proof refrigerators, but a major lack of concern with other sources of hazard. Auxiliary venting of all chemical storage areas, and areas where hydrogen, oxygen and other highly flammable gases are used or stored, is becoming more and more of a problem because more and more gas is being used in laboratory work. Aside from problems of asphyxia and danger to health, the potential for explosion and fire is becoming greater as more cylinders are introduced into the laboratory scene.

Communications and training are two main areas for concern. It is an axiom in the safety field that an efficient operation is a safe operation. But how do we measure the efficiency of a research or experimental laboratory? Usually, we have no basis by which we may scientifically appraise the background training or the level of proficiency that students, laboratory technicians or others have in dealing with the multiplicity of problems they may encounter in performing laboratory functions safely. A number of schools and colleges are graduating people who are the students and technicians of the future, and these graduates, although they may be technically proficient, are not well schooled in either the theory or the practice of safety in the laboratory. In fact, many of them probably have developed a number of unsafe habits which they will carry with them to any laboratory they are associated with in the future. How do we, as safety professionals, counter and correct these problems? Problems which in the final solution can best be handled through training (or retraining) and proper communications. Bulletins and a laboratory safety manual are a prime method for reaching for and holding the interest of people with whom we may not deal on a day-to-day basis; also, this group may have diverse interests because of the number of special areas of science that you could be working with. The second tool is, of course, the seminar, lecture or training session. Even when small groups are involved, it is sometimes a problem to get these people together. But if you are successful, these meetings serve to concentrate on safety and they can be very superior if audio-visual techniques are combined to reinforce the story you wish to tell. Signs on walls and closets which are unusual and emphatic in the message they convey, may also serve as silent reminders of things which are dangerous or unwise acts.

The proper use of signs is an area where considerable work remains to be accomplished, particularly in the laboratory situation and with respect of the high caliber of person you are usually trying to reach to direct and remind. The sign, in some situations, serves best of all because it is always working for you, it is always in sight at the scene of the problem where, ideally, you would like to be, and it never raises its voice to possibly offend an individual who should know better but who may have forgotten what he heard or read but never really learned in the past.

Lately, but nevertheless a major consideration in the proper design or operation of any laboratory, is the biomechanical problem of matching benches, chairs or stools with people. I place people last because this is the usual order of priority. Laboratories, not unlike other work situations in some industries, generally have people accommodate to the workplace where they are assigned, much like the legendary robber, Procrustes, who, in Greek mythology, made his guests fit his famous bed, either by stretching them to fit if they were too short, or cutting off limbs if they were too tall. The poor match at the interfaces where some people work in laboratories produces strain, fatigue and can lead to accident situations. The use of anthropometric averages in the design of bench heights, and the use of chairs and stools which are not variable within a wide range and do not give needed support to backs and legs, poses an area for concern. Much remains to be done to correct many of the poor relationships created between the man and his working environment in the laboratory.

In conclusion, let us make the observation that the laboratory has come a long way, but it still has a long way to go, as far as accident prevention and health protection are concerned. We are not, I hope, and we should not, ever approach safety in the laboratory as an "after the fact" problem. We must be able to eliminate or reduce much of the probability for laboratory accidents, and this demands a predictive approach to all kinds of unsafe acts and/or unsafe conditions. To do this, we must have the full backing and unlimited cooperation of management at the top, as well as all of the other teams working to provide services without which the laboratory could not function. But we must always think of the laboratory of future decades and ponder on what we can do to have them think of us with charity. I ask you to think about the future of your various laboratories as I leave you.

MINUTES

ANNUAL MEETING OF THE CAMPUS SAFETY ASSOCIATION
19TH NATIONAL CONFERENCE ON CAMPUS SAFETY
BROWN UNIVERSITY, PROVIDENCE, RHODE ISLAND
JUNE 27, 1972

Opening: The annual business meeting for the Campus Safety Association was held on June 27, 1972, in connection with the Nineteenth National Conference on Campus Safety held at Brown University, Providence, Rhode Island. Mr. Earl Rupp, chairman of the Association, presided over the meeting.

Treasurer's Report: The financial report for the Association was presented by Ray Hall, treasurer for the Association. Mr. Hall reported that an official audit was made of the accounts of the Association and were approved. The present balance was reported to be $3,686.00.

CSA Exhibits: Ray Hall reported on the expenses in connection with CSA exhibiting at two Conferences during the past year--the American College Health Association Conference in Atlanta and the College and University Conference and Exposition in Chicago. Several persons reported on the importance of continuing our exhibiting at the ACHA Conference, but because of poor attendance, it was decided not to exhibit at CUCE.

Laboratory Safety Guidebook: Chairman Rupp called for a report on the status of the Laboratory Safety Guidebook formerly published by the University of Illinois at Chicago Circle Campus. The NSC staff representative, Jack Green, reported that Ray Ketchmark had made corrections in the publication and has turned it over to the National Safety Council to publish and distribute. Green reported that the Council had not taken any action on the publication at this time.

CSA Newsletter: Mr. Rupp reported that he felt that the editor of the CSA Newsletter should receive some remuneration for his services, but he would leave this up to the chairman-elect for the Association. It was reported that Ron McGill would continue to edit the Newsletter for another year. Mr. McGill reported that he was unable to publish only two issues last year but would publish more next year.

Campus Safety Primer: Pat Eaker reported that this project came about last year but nothing was done until the 1971 Congress at which time a basic outline was developed. The outline was based on eight elements and to continue the project, Mr. Eaker desires to have eight editors to be in charge of each of the elements. The primer is to be small and volunteers to assist are needed.

CSA Share Certificate: The Association voted to issue one share of the Campus Safety Association to Robert Jessup for his fine work in editing the Current Fire Report for the Association. The staff representative was asked to prepare the certificate.

Fire Committee: The new chairman of the Fire Committee, Richard Giles, reported that he would turn in his report on College and University fires to the editor of the Campus Safety Newsletter. He will also conduct a section on questions and answers in the Newsletter.

Congress Participation: Mr. Rupp urged each CSA member attending the National Safety Congress to attend not only the Campus Safety meetings but also the meetings of the other divisions of the Council's College and University Section.

State Campus Safety Organizations: Chairman Rupp remarked that a number of states were organizing state Campus Safety groups and meetings during the year. Several persons reported on the meetings held in their states: Reginald Brett for College and University Safety Council of Ontario, Canada; John Hill for Texas; Ray Ketchmark for Illinois. Larry Blake stated that he is interested in organizing a campus safety organization in North Carolina.

New Chairman Presides: Chairman Rupp expressed his appreciation for the cooperation he received from the membership during the past year and turned the gavel over to the chairman-elect, Ray Ketchmark.

CSA Committees: Mr. Ketchmark named the following committees and explained that others would be selected: Laboratory Safety--John Fresina; Chairman: OSHA--Ron McGill; Chairman: Site Committee--Ed Simpson; Fire--Dick Giles; and Advisory Committee-- Gus Scheffler, Chairman.

Sharing Ideas: Chairman Ketchmark explained that he was quite anxious for the Association members to be able to share ideas. Ron McGill stated that if persons would send their ideas to him, he would publish them in the Campus Safety Newsletter.

Conference for 1973: Mr. Ketchmark announced that the 1973 National Conference on Campus Safety is scheduled for Colorado State University, Fort Collins, on June 27, 28 and 29. Colleges and Universities interested in hosting Conferences in the future should contact Edward Simpson at the University of Nebraska at Lincoln.

The meeting was adjourned.

Respectfully submitted,

William Watson
Recording Secretary

CAMPUS SAFETY ASSOCIATION

Income and Expense Report and Budget

	Actual	Budget
	7/1/71 to 6/30/72	7/1/72 to 6/30/73
REVENUE		
National Conference (18th)	$885.43	$1,000.00
Interest on Deposits	107.02	110.00
Total Income	$992.45	$1,110.00
EXPENDITURES		
Chairman's Expenses	-0-	75.00
Representation at Professional Conferences	99.98	400.00
Exhibitors Fees	350.00	500.00
CUCE------------$250.00		
ACHA------------ 100.00		
Exhibitors Services	236.68	-0-
CUCE------------$111.00		
ACHA------------ 125.68		
Monographs (NSC)	305.20	150.00
Publications Support	220.25	150.00
Newsletter (NSC)----$ 73.00		
CSA Certificates---- 39.15		
Edwards Letter Shop- 108.10		
Total Expenditures	$1,212.11	$1,275.00
Excess Expenditures Over Revenue	$ 219.66	$ 165.00

TO THE EXECUTIVE COMMITTEE, CAMPUS SAFETY ASSOCIATION:

I have examined the records of the Treasurer, Campus Safety Association for the period November 1, 1969 to May 31, 1972.

The attached Statement of Cash Receipts and Disbursements for the period November 1, 1969 to May 31, 1972 summarizes the transactions of the Campus Safety Association.

Hugh M. Liddle
Hugh M. Liddle
Internal Auditor

CAMPUS SAFETY ASSOCIATION
STATEMENT OF CASH RECEIPTS AND DISBURSEMENTS
FOR THE PERIOD NOVEMBER 1, 1969 TO MAY 31, 1972

Cash Balance, December 8, 1969			$2,272.23
Receipts			
National Conferences			
16th	$1,077.81		
17th	1,325.83		
18th	885.43		
		$3,289.07	
Interest		371.98	
Refund CUCE December 13, 1971		25.00	
Total Receipts			3,686.05
Total Funds to be Accounted For			5,958.28
Disbursements			
Travel Expenses		$ 610.83	
Publications		369.69	
Exhibitors Fees & Expenses		1,001.68	
Monographs, Safety Certificates		494.11	
Total Disbursements			2,476.31
Cash Balance, May 31, 1972			$3,481.97

OTHER SAFETY MONOGRAPHS FOR SCHOOLS AND COLLEGES

(Monographs No. 1,2,3,5,6,13 and 16 are out of print and are available by loan only from the NSC Library.)

NO. 1 1952 EXPERIENCING SAFETY IN COLLEGE AND UNIVERSITY LIVING CENTERS. Personnel Section, American Association of Colleges for Teacher Education and the Higher Education Committee, National Safety Council.

NO. 2 1954 FIRST NATIONAL CONFERENCE ON CAMPUS SAFETY. University of Illinois and the National Safety Council.

NO. 3 1955 SURVEY OF ACCIDENTS TO COLLEGE STUDENTS. American College Health Association and the National Safety Council.

NO. 4 1955 SECOND NATIONAL CONFERENCE ON CAMPUS SAFETY. University of Minnesota and the National Safety Council. $1.80.* Stock No. 429.50-4

NO. 5 1956 ACCIDENTS TO COLLEGE STUDENTS. American College Health Association and the National Safety Council.

NO. 6 1956 THIRD NATIONAL CONFERENCE ON CAMPUS SAFETY. Massachusetts Insititute of Technology and the National Safety Council.

NO. 7 1957 FOURTH NATIONAL CONFERENCE ON CAMPUS SAFETY. Purdue University and the National Safety Council. $1.80* Stock No. 429.50-7.

NO. 8 1958 FIFTH NATIONAL CONFERENCE ON CAMPUS SAFETY. California Institute of Technology and the National Safety Council. $1.80.* Stock No. 429.50-8.

NO. 9 1959 SIXTH NATIONAL CONFERENCE ON CAMPUS SAFETY. Michigan State University and the National Safety Council. $1.80* Stock No. 429.50-9.

NO. 10 1960 SEVENTH NATIONAL CONFERENCE ON CAMPUS SAFETY. Cornell University and the National Safety Council. $1.80.* Stock No. 429.50-10.

NO. 11 1961 THE BICYCLE AND THE MOTOR SCOOTER ON THE COLLEGE CAMPUS. Michigan State University, the University of Washington and the National Safety Council. $1.25.* Stock No. 429.50-11.

NO. 12 1961 EIGHTH NATIONAL CONFERENCE ON CAMPUS SAFETY. Southern Illinois University and the National Safety Council. $1.80.* Stock No. 429.50-12.

NO. 13 1962 ORGANIZATIONAL STATUS AND DUTIES OF CAMPUS SAFETY PERSONNEL. Los Angeles City School System and the National Safety Council.

NO. 14 1962 INJURIES IN MEN'S PHYSICAL EDUCATION AND INTRAMURAL SPORTS. Michigan State University and the National Safety Council. $1.80*. Stock No. 429.50-14.

NO. 15 1962 SAFETY EDUCATION LAWS AND REGULATIONS. State University of New York and the National Safety Council. $1.25.* Stock No. 429.50-15.

NO. 16 1962 NINTH NATIONAL CONFERENCE ON CAMPUS SAFETY. University of California at Berkeley and the National Safety Council.

NO. 17 1963 TEACHER PREPARATION AND CERTIFICATION IN DRIVER EDUCATION. Illinois State University, Iowa State University and the National Safety Council. $1.25.* Stock No. 429.50-17.

NO. 18 1963	TENTH NATIONAL CONFERENCE ON CAMPUS SAFETY. Indiana University and the National Safety Council. $1.80.* Stock No. 429.50-18.
NO. 19 1964	ELEVENTH NATIONAL CONFERENCE ON CAMPUS SAFETY. Rutgers University and the National Safety Council. $1.80.* Stock No. 429.50-19.
NO. 20 1965	TWELFTH NATIONAL CONFERENCE ON CAMPUS SAFETY. Central Michigan University and the National Safety Council. $1.80.* Stock No. 429.50-20.
NO. 21 1966	THIRTEENTH NATIONAL CONFERENCE ON CAMPUS SAFETY. University of Washington and the National Safety Council. $1.80.* Stock No. 429.50-21.
NO. 22 1966	SEMINAR FOR SAFETY EDUCATION SUPERVISORS. Indiana University, Insurance Institute for Highway Safety and the National Safety Council. $1.25.* Stock No. 429.50-22.
NO. 23 1967	FOURTEENTH NATIONAL CONFERENCE ON CAMPUS SAFETY. University of Nebraska and the National Safety Council. $1.80.* Stock No. 429.50-23.
NO. 24 1967	COLLEGES AND UNIVERSITIES HIGHWAY TRAFFIC AND SAFETY CENTERS. College and University Safety Centers, Division of Higher Education Section, National Safety Council. $1.25.* Stock No. 429.50-24.
NO. 25 1968	FIFTEENTH NATIONAL CONFERENCE ON CAMPUS SAFETY. University of Vermont and the National Safety Council. $1.80.* Stock No. 429.50-25.
NO. 26 1969	SIXTEENTH NATIONAL CONFERENCE ON CAMPUS SAFETY. Texas A & M University and the National Safety Council. $1.80.* Stock No. 429.50-26.
NO. 27 1970	SEVENTEENTH NATIONAL CONFERENCE ON CAMPUS SAFETY. University of California at Santa Barbara and the National Safety Council. $1.80.* Stock No. 429.50-27.
NO. 28 1971	EIGHTEENTH NATIONAL CONFERENCE ON CAMPUS SAFETY. University of Illinois at Chicago Circle Campus and the National Safety Council. $3.50.* Stock No. 429.50-28.**
NO. 29 1971	NATIONAL SAFETY EDUCATION CURRICULUM GUIDELINES (K-6). Indiana University at Bloomington and the Elementary School Section of the National Safety Council. $3.50.* Stock No. 429.50-29.**
NO. 30 1972	A HISTORY OF NATIONAL SAFETY COUNCIL SCHOOL SAFETY ACTIVITIES. Author, Dr. Vivian Weedon. $3.50.* Stock No. 429.50-30. (Available late 1972)
NO. 31 1972	SAFETY IN K-6 STUNTS AND TUMBLING. Author, Miss Victoria Benedict. $3.50.* Stock No. 429.50-31.
NO. 32 1972	NINETEENTH NATIONAL CONFERENCE ON CAMPUS SAFETY. Brown University and the National Safety Council. $3.50.* Stock No. 429.50-32.**

**Beginning with No. 28, the Monograph series is expanding to include a variety of subjects covering all levels of school safety. The new series title "Safety Monographs for Schools and Colleges" reflects this change.

* Except for sale items (all Monographs-1966 and prior- $1.00 ea.) prices subject to 20% discount to NSC members. For quantity prices write Order Dept., National Safety Council, 425 No. Michigan Ave., Chicago, Ill., 60611. Specify complete title and Stock No. Payment must accompany orders for $5.00 or less.